JUNE 18, 1951

STEEL

The Weekly Magazine of Metalworking

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FASTENERS: Business by the Billions

—see page 53

Battle of Wage Bulge Nears Showdown, p. 43
An 'Erector Set' Constructed Test Laboratory, p. 75
Titanium and Zirconium—Vacuum Melted, p. 77

8 *Important Features of* EC&M *Magnetic Control*

1. Time-Current Acceleration
2. Line-Arc Contactors
3. Wright Hoist Circuit
4. Tab-Weld Resistors
5. Cam Master Switches
6. Safer Electrical Interlocks
7. Bolted, Welded Frame
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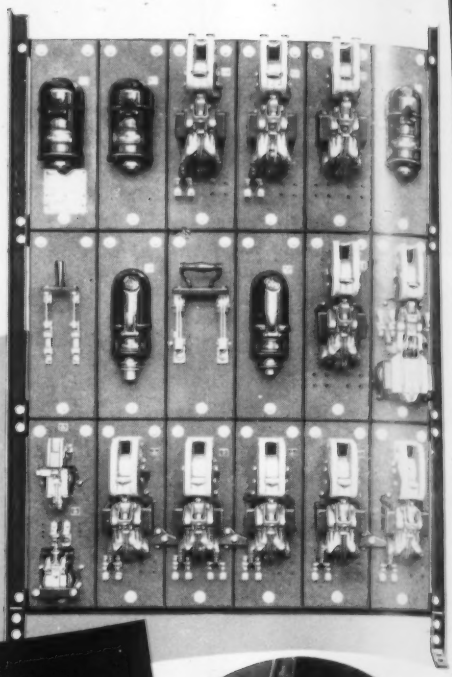
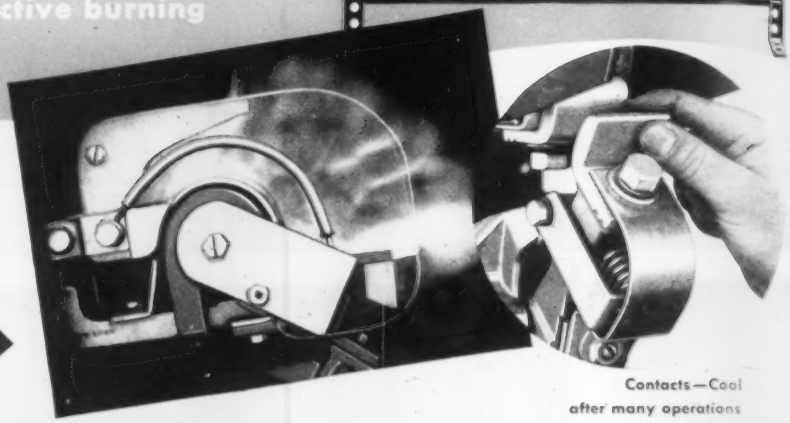


LINE-ARC Principle

- lengthens contact life
- eliminates destructive burning of arc shields



At right is shown a *LINE-ARC* Contactor specially fitted with glass arc shields to demonstrate the *LINE-ARC* principle. The glass was neither smudged nor harmed in this test.

Contacts—Cool after many operations

THE *LINE-ARC* PRINCIPLE REDUCES UPKEEP

A popular feature of EC&M LINE-ARC Contactor Control is reduced upkeep resulting from cool contact operation and centering of the arc between, but not touching, the arc shields.

LINE-ARC is an exclusive EC&M feature which proves itself wherever high output depends upon rapid and repetitive making and breaking of power circuits to the motor. When the contactor opens, the arc is transferred from the contacts quickly (in 1/500th sec.). The arc transfers to the arcing-plate and the circular guard over the blow-out coil where it is quickly extinguished.

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STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 25 JUNE 18, 1951

THIS WEEK IN METALWORKING

NEWS

Behind the Scenes 6
Letters to the Editors 12
The Metalworking Outlook 35
As the Editor Views the News 39
The Metalworking Contract Summary 48
Checklist on Controls 49
Windows of Washington 50
Mirrors of Motordom 57
The Business Trend 61
Men of Industry 65
Obituaries 69

PRODUCTION-ENGINEERING

Engineering and Production News at a Glance 71
High Speed Quenching Oils Increase Surface Hardness 72
"Erector Set" Construction Used in Test Laboratory 75
Duplex Setup Solders Type to Typewriter Bars 76
Vacuum Melting Titanium and Zirconium 77
How To Estimate Special Machine Costs 82
Progress in Steelmaking—Screening and Charging Practice Increases Furnace Yield 86
Calendar of Meetings 128
New Products and Equipment 131
Helpful Literature 145

MARKETS

The Market Outlook 149
Metal Prices and Composites 150
Nonferrous Metals 161
Metalworking Briefs 171

Editorial and Business Staff—Page 10. Advertising Index—Page 178. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Next Week **... Proper Lubrication Lengthens Wire Rope Life... Precision Rolling Thin-Gage Magnetic Alloys... Sigma Welding Applications Expand...Hot Metal Cars and Mixers—How Design Factors Affect Lining Life**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35 cents. Metalworking Yearbook issue $2.00. Entered as second class matter at the postoffice in Cleveland, under the Act of March 3, 1879. Copyright 1951 by Penton Publishing Co.

ELGIN ANNOUNCES

A COMPLETELY NEW, FASTER CUTTING DIAMOND ABRASIVE COMPOUND SPECIALLY DESIGNED FOR FINISHING *CARBIDE*

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HEADING DIES

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Six months of actual shop tests prove DYMO-C removes stock up to 20% faster than diamond powder—olive oil mixtures. In DYMO-C, mixing is eliminated . . . waste reduced . . . "slinging" minimized. Available in jars or applicator guns. Write today for complete information and free demonstration.

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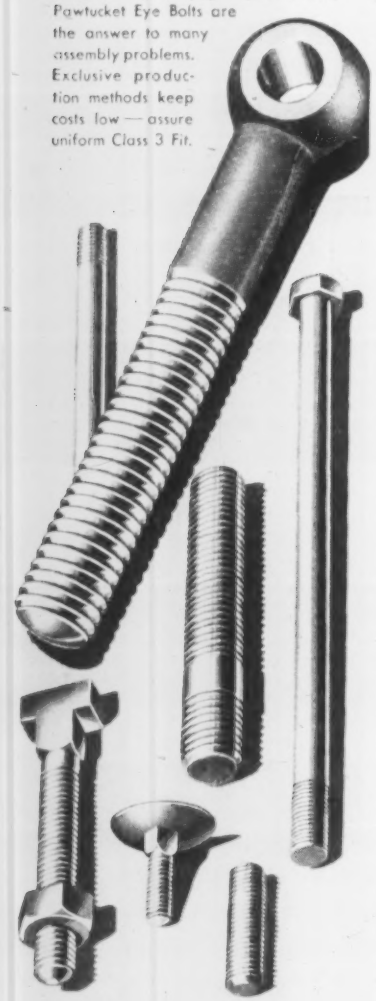

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THE PLACE TO SOLVE YOUR BOLT PROBLEMS

T.M. REG.

Behind the Scenes...

Help on CMP

Roll out the carpets, sound the trumpets! Coming up next week, June 25, is STEEL's *pièce de résistance*, a special 32-page section that puts into one package all you need to know to operate under the Controlled Materials Plan. Included in the report will be interpretations in readable language of all sections and subsections put out by Washington on CMP. Also wrapped in the package will be an up-to-date checklist of all NPA regulations, delegations etc.

The report will come out about a week before CMP actually goes into effect, July 1. This aid to industry is being prepared by Associate Editor Vance Bell who has been traveling by land and air lately to interview industrialists who have served as consultants on the plan and government men who are working it out, including Mr. CMP himself, Walter Skuce.

Last But Not Least

The last editorial item in this issue, on page 175, is to the effect that Kennametal Inc., Latrobe, Pa., has received a $4.1 million ordnance contract. It's the last item in the last editorial department in STEEL, Metalworking Briefs, which this week begins on page 171.

The section might be more aptly called Business Leads, for in it each week are some 35 brief accounts of organizational changes, construction projects and contract awards which are the raw material from which new business can be generated. In a year's time, more than 1800 such business leads are published.

The feature can trace its ancestry away back to the early 1900s when a Construction and Enterprise department was started. The name was changed a while ago to Metalworking Briefs because the C&E scope was broadened to include information on organizational shifts, as well as the original construction and contract data.

Customer's Man

Metal Electric Processing Co. has created an entirely new kind of vice president. O. B. Morrison, of that Toledo, O., firm, now carries the title of vice president for the customer. His duties are to proceed exactly as if he were the direct agent of the firm's customers.

Just another vice president? "Not at all," says C. W. Morrison, president of the company and brother of the vice president. "The practical effects of the title as well as the psychological effects have been very good," he declares. "The title has the effect of emphasizing the identity of interest between the firm and its clients. It looks as if we were absolutely first in this," he adds. "I hope for the good of all business that we won't be the last."

In learning about the vice president, we first suppressed a smile, but we ended up impressed. No more will we make light comments about that office. A tip of our hat to the Morrisons, C. W. and O. B.

Everybody Needs It

No wonder there's a steel shortage. Even John's Chili Parlor wants to buy steel for tubing. That Logansport, Ind., firm has sent one of hundreds of letters to our Readers' Service Department asking where to get the material. Readers' Service can answer an amazing range of questions, but the where-can-I-buy-steel query is becoming nearly unanswerable. John's Chili Parlor, dispenser of ready-to-serve barbeque, chili and spanish hot dog or coney island sauce with meat, needs small sizes of rectangular steel tubing. We trust the tubing will not be put in those hot dogs.

Puzzle Corner

First in with correct answers to the June 4 problem about the yarn were T. S. Bean of Barber & Ross Co., John Leeve of Helmco Inc., Paul C. Smedley of Ohio Crankshaft Co., Helen Fyfe of Central Iron & Steel Co., C. E. Blass of Talon Inc. and Joseph J. Santoleri of Lukens Steel Co. The unscrupulous woman had a ball 7.65 inches in diameter, equaling 87.5 per cent of the yarn. The other woman was left with 12.5 per cent of the yarn.

Suppose the earth were a perfect sphere 2500 miles in circumference, and suppose a telephone line were erected on poles about the equator. Assuming that the telephone wire would then form a circle concentric with the equator, would a man be able to walk under the wire without touching it if the total length of the wire exceeded the circumference of the earth by 50 feet?

Shrdlu

(Metalworking Outlook—Page 35)

How to expand your plant's production without extra construction or manpower!

WARNER & SWASEY'S new CAMLESS 5-Spindle Automatics have expanded greatly the productive capacity of Alloy Steel Products Company. Previously, production of their stainless steel valves for the chemical and oil industries, limited to short runs, had been done profitably on hand machines.

But increased production required building space for more machines as well as hiring more operators. Their only other choice was to consider new production methods.

Alloy Steel made their choice —Warner & Swasey Camless 5-Spindle Automatics. Ideally suited for short and medium runs, these new automatic machines now handle *profitably* 69 different jobs in lots from 200 to 500. Volume—better in quality and finish—has stepped-up 50% in all-over average. No investment in cams is needed!

And—particularly important in today's tight manpower market —more work can be done with fewer operators.

If you are faced with production schedules that apparently require additional construction and manpower, call in your nearest Warner & Swasey Field Representative. He'll be glad to show you just how a Warner & Swasey Automatic can help.

Warner & Swasey CAMLESS 5-Spindle Automatic at ALLOY STEEL PRODUCTS CO., Linden, New Jersey.

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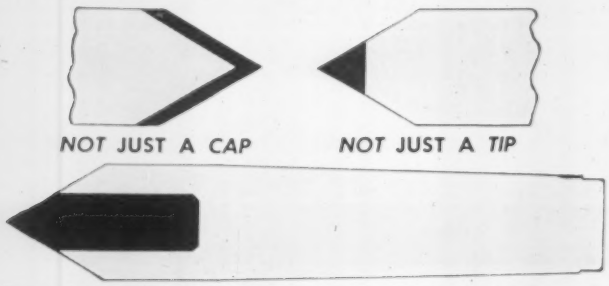
YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

Gorham "M-40-U" ALLOY CENTERS
LAST THREE TO TEN TIMES LONGER

Here's a center that outlasts high speed steel and other ferrous and non-ferrous alloy centers from 3 to 10 times before it shows wear—and you can re-dress it countless times!

"M-40-U" is a special alloy developed by Gorham expressly for use as a wear, heat and abrasion-resistant metal. A core of this material is induction brazed in the steel shank of the center, after which the entire center is finish ground. Thus, the wear material is always supported by the tough shank steel throughout the life of the center. These centers require only a cleanup grind when wear finally occurs, and many cleanup grinds can be made without loss of wear-resistant properties, since the "M-40-U" alloy is actually a *deep core*, rather than a clad or applied *tip*.



But a *long, solid core* that you can re-dress many times—and get a good-as-new center every time!

This Gorham center folder gives full description, dimensions and prices. Send for your free copy today.

Gorham "M-40-U" Alloy Centers and Half-Centers are available for immediate delivery. Morse, Jarno or Brown & Sharpe taper shanks, all popular sizes in stock, "specials" to your specification. Put an "M-40-U" Alloy Center on every lathe, automatic and grinder in your shop—watch them pay for themselves in down-time saved, *PLUS* the precision production you get with centers that stay true longer.

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LETTERS
TO THE EDITORS

Liners: Suggestions Welcome

We are interested in any material that will eliminate use of rubber to line steel tank cars for caustic soda service (STEEL, May 28, p. 75). Any suggestions that might be given by your readers will be welcomed.

J. M. Grulich, research & development director
American Car & Foundry Co.
New York

• See STEEL, *June 11, p. 12.*

Making Connections

For many years we have represented Alabama By-Products Corp., Birmingham, Ala., and in addition sell most of the foundry coke used by Cuban foundries. Now we are seeking to represent a manufacturer of ferro-silicon briquets and will appreciate names of some producers in the United States and Canada.

L. Quesada, president
Havana Steel Co. S.A.
Havana, Cuba

• *Some manufacturers of this product are: Union Carbide & Carbon Corp., Electro Metallurgical Division, 30 E. 42nd St., New York 17; Vanadium Corp. of America, 420 Lexington Ave., New York 17; and Ohio Ferro-Alloys Corp., Canton, O.*

Bonding Silicone Rubber

Who manufactures or sells the bond for silicone rubber noted in STEEL, May 14, p. 79?

R. W. Nelson, process engineer
Grayson Controls Division
Robertshaw-Fulton Controls Co.
Lynwood, Calif.

• *Write to Chemical Department, General Electric Co., Pittsfield, Mass. Product's name is "GE-81267 primer."*

Needed: Manufacturers Agents

I note your item in the Metalworking Outlook titled "Uneasy: Manufacturers Agents" (STEEL, Apr. 30, p. 18). We have several companies that could use manufacturers agents for their expanding businesses. Can you suggest a way for us to secure a list of agents for these clients?

H. A. Toulman Jr.
Toulman & Toulman, attorneys at law
Dayton, O.

• *Write to Edwin Thomas, executive secretary, Manufacturers Agents National Association, 542 South Broadway, Los Angeles 13.*

Constructive Analysis

The "26th Annual Financial Analysis of the Steel Industry" is most constructive and helpful. We appreciate the valuable information placed before us by STEEL.

James M. Stewart, secretary
Elgin Water Softener Corp.
Elgin, Ill.

STEEL

The Metalworking Outlook

June 18, 1951

Take CMP Allotments, Or Else

There's no basis for the widespread report that you need not accept CMP allotments but can go into the free market instead for your materials. If you reject your allotments, you have only one recourse: Go out of business. An order clarifying that matter will be issued by NPA soon. Materials other than steel, copper and aluminum may come under CMP, although nothing specific has yet been developed. NPA is convinced, as a result of CMP studies, that we need 35 per cent more steel than is now being produced.

Defense Act Debate Continues

There's little chance that Congress will act in time to pass a new Defense Production Act when the old one expires June 30. The old one will be extended for a short time. Congressional committees are wrangling particularly over business licensing and plant seizure provisions in the new measure. The Administration may retreat on its requests for plant seizure, but it's fighting hard for the power to license business so it can more easily and efficiently enforce pricing regulations.

Price Lid Tightens

Don't expect the government to grant you price increases on the grounds that restrictions in your output, as with consumer durable goods, have increased your costs. Defense Boss Charles E. Wilson has already given a flat "no" to questions on that subject. OPS people are delighted with the current price decline. In the week ended June 5, the Bureau of Labor Statistics' all-commodity index, 181.9 per cent of the 1926 average, was only 1.1 per cent above the level of Jan. 23, 1951.

Regulaton W Doing Well

Despite the pressure on the Federal Reserve Board and Congress, no easing is in sight on Regulation W, the consumer credit control. FRB people think it's working fairly well. If any changes do come, they will be modifications in the mechanics of administering the regulation. The auto industry, including labor unions, is pushing the hardest for relief.

The Housing Deluge: Still On

Federal Reserve Board's Regulation X, the control on housing financing, is not working so well. In May new housing starts totaled 97,000, a 10 per cent jump over April. Much of that gain was in apartment construction. The apparent demand for single-family houses is also high. Total housing starts for the first five months this year are 444,-

Production-Engineering News—p. 71 The Market Outlook—p. 149

500, only exceeded by the total in the same 1950 period. Watch for a tighter Regulation X.

Taxes—No Business Damper Yet

Metalworking's activity for the short term won't be particularly affected by the pending corporate tax increases. The House Ways & Means Committee has the tax bill in final form, and it's rarely changed on the House floor. Corporations will be socked by a 5 percentage point boost in their income levies retroactive to Jan. 1, 1951. The overall ceiling on how much of corporate earning could be taken in taxes would go up 8 percentage points to 70 per cent.

The Atom in Industry

Expect greater use of radioisotopes in industry now that the atomic energy program is increasing. To date, more than 17,000 shipments of radioisotopes have been made from the Oak Ridge, Tenn., production center to more than 500 research institutions and industrial firms in the U.S. and to nearly 200 research institutions abroad. The number of users is steadily increasing. Industry uses of radioisotopes include determining the height of liquid metal in foundry cupolas and research.

Problem in Economics

From now on many business indexes should be followed with more reservations than is normal in peacetime. Does a factory have a greater or lesser volume of output when production shifts from 20,000 automobiles a year to 3000 antiaircraft guns and 300 tanks? The Federal Reserve Board ran into that problem in World War II and is encountering the rearmament factor again now in calculating its industrial index.

Straws in the Wind

Chrysler Corp. is starting a series of procurement clinics around the country to help small business get contracts . . . The new Green River Steel Corp., Owensboro, Ky., seeks to sell $4 million in debentures and common stock, a $3.6 million loan from the RFC, and a $5 million loan under the Defense Production Act . . . Colorado Fuel & Iron Corp. has withdrawn application for fast tax amortization of the $109.6 million plant planned at Tonawanda, N. Y. . . . The New England steel mill project got a further setback when the Connecticut legislature adjourned without acting on an eminent domain bill which would have permitted land seizure for the proposed plant . . . The steel industry employed 665,700 in April for an alltime high.

What Industry Is Doing

WSB is struggling for a pay boost formula, but probably won't come up with an effective one until late summer or early fall (p. 43) . . . Steel output hit 9,094,000 tons in May for an alltime peak (p. 43) . . . Nearly $500 million worth of subcontract business a year is generated by the atomic energy program (p. 45) . . . Fastener makers are banking on CMP to help solve their materials problems (p. 53).

Improvement Due

American industry has made such marked progress in recent years that observers all over the world are seeking the answer. Visiting teams have studied our techniques and have returned home to write reports explaining our accomplishments. These reports attribute our success to high investment in machines and equipment, high wages and other incentives, favorable working conditions and many other factors.

These advantages seem important to visitors from abroad because they are in sharp contrast to the conditions with which they are familiar at home. However, most visitors overlook a factor which presents an even more violent contrast. That factor is the free interchange of "know-how" between competing producers and manufacturers. Nowhere in the world has the once carefully guarded "trade secret" been abolished as effectively as it has in our country. Today an improved technique developed by Company A in January becomes routine practice in plants B to Z by December.

This is terrifically important. It is one reason why industry made such a good showing in World War II. It is one of the reasons why we can look forward to future challenges with confidence. This cross-fertilization of ideas achieves a pollination of essential "know-how" in numerous industrial plants promptly and effectively.

Certainly the advantages of this system should be utilized to the utmost during the present period of mobilization. Is it being thus utilized? No. Its effectiveness is being impaired seriously by improper interpretations of the national policy in regard to security regulations. Time and time again decisions made at bureaucratic level result in the withholding of valuable "know-how" from American companies needlessly.

No reasonable person can object to a tight clampdown on information which really should be kept secret from the enemy. What is sorely needed is an overhauling of the mechanics of censorship. Policies should be clarified so that officials who do the censoring are not compelled to lean over backwards to "play safe."

During World War II the system of censorship improved with experience as the war progressed. The time has come in the present emergency when a corresponding improvement is due.

E. L. Shaner

EDITOR-IN-CHIEF

SEEK WAGE PATTERN: Last week witnessed a wave of new labor disputes and the outlook is for more in the near future. Back of the present unrest is a contest being waged in Washington, where the Wage Stabilization Board is trying to develop a wage pattern.

One of three things could happen. WSB could attempt to define a wage policy adhering closely

to the old wage freeze at levels no higher than 10 per cent above January, 1950, rates. Or, WSB could simply give in to union pressure and grant liberal increases. Neither of these courses is likely, for fairly obvious reasons.

The third alternative is a compromise between the two. This appears to be most likely in the opinion of those closest to the scene. Also it is believed that the give and take required to reach this compromise will continue until late summer or early fall, when a formula—possibly tied to living costs—may be developed. —p. 43

* * *

METAL OUTPUT IN '50: American Iron & Steel Institute estimates that 93 million net tons of metals in all forms were shipped by domestic producers to consumers in 1950. This total is made up of 72.2 million tons of finished steel, more than 15 million tons of cast ferrous products, and 5.1 million tons of aluminum, copper and brass, lead and zinc. On the basis of these estimates, the breakdown is 94.5 per cent for ferrous metals and 5.5 per cent for nonferrous metals.

That these figures will be exceeded in 1951 is indicated by the marked gains in production during the first five months of this year. For instance, output of ingots and steel for castings in this period was an unprecedented 43,614,444 net tons, an increase of 12 per cent over comparable 1950 output. Ingot output in May was over nine million tons—another all-time high. —p. 43

* * *

AEC IS BIG BUSINESS: Atomic Energy Commission already has become a giant business. By the time its present expansion program is completed, it will have invested about $4.5 billion in plant and equipment. In the year ending last Mar. 31, AEC placed nearly 11,000 prime contracts and purchase orders.

These impressive figures indicate that AEC is a potential source of considerable business for the metalworking industries. Gordon Dean, Chairman of AEC, says that 52 per cent of its prime contracts go to companies employing fewer than 500 workers, 41 per cent to larger companies and 7 per cent to educational and other institutions. Of the subcontracts, 62.5 per cent go to small companies, 36 per cent to large firms and 1.5 per cent to institutions. Union Carbide, General Electric and Du Pont are the principal AEC production contractors. —p. 45

* * *

200 MILLION A DAY: Few persons fully appreciate the important role played by fasteners in our modern mode of living. More than 400,000 different types and sizes of fasteners can be ordered from the approximately 300 companies which constitute the industry in the United States. These companies employ 30,000 persons and turn out about 200 million pieces daily. This year the dollar volume of their business will hit $535 million.

Despite its vital importance, the industry consumed only slightly more than 2 per cent of the nation's steel output. About 25 per cent of this consumption goes right back to the furnaces in the form of scrap, so the net take is 75 per cent, which is climbing steadily. This means that over a million tons of fasteners are produced and shipped each year.

Chief problem of the industry is assurance it can continue to get its better than 2 per cent of steel output. It is relying on the interim M-60 to support it until CMP becomes fully effective. —p. 53

* * *

TV'S DIESEL MARKET: Television seems to be creating an interesting market opportunity for diesel engines. In areas beyond the reach of the present coaxial cable network, telephone messages and television picture images can be transmitted by means of properly spaced microwave relay towers. Many isolated districts owe their ability to receive "live" television broadcasts to the rapid expansion of microwave-relay systems.

Dependable electric power is absolutely essential to the proper functioning of a relay tower. Sometimes towers must be located in isolated spots, access to which may be difficult in some seasons of the year. In such instances, the diesel engine is an ideal source of power for the generator set. A four-unit diesel-powered generator station has been installed at Omaha. Other installations are planned in connection with the extension of TV relaying towers in Utah, Nevada, Virginia, Alabama, Mississippi and Texas. —p. 104

Hold Tight for Bad Wage Weather

WSB struggles for a pay boost formula but probably won't come up with an effective one until late summer or early fall when it may tie in wages with living costs

THE BATTLE of the bulge—in wages—is moving toward a showdown.

You—in the middle as usual—will have to wait until late summer or early fall to know if labor will win its sweeping pay advances or whether government can hold the line. In Washington, middle echelon people, not top brass, are loudly saying they will retreat no further.

One of Three—A national wage policy will be on one of three possible courses by late summer or early fall. By then, the Wage Stabilization Board will have to come up with some sort of pattern in the task of ruling on the more than 2000 cases now before it. That policy may never be formalized, but it will still be there. Any formula put in words in the next few weeks could turn out to be meaningless because the pattern is just beginning to be evolved now.

One possible course for the wage policy to take could be strictly along the lines of the old wage freeze of no higher than 10 per cent above January, 1950, levels. Some government attorneys (STEEL, June 11, p. 55) say WSB will disapprove most of the cases now before it and will hold that pay line. Washington would be prepared to take over plants where workers strike for wages in excess of the 10 per cent limit. Defense Stabilizer Eric Johnston is on record as favoring a tough policy. And the Defense Act gives the Administration power to seize struck plants.

The Weight Against—Is it likely that such a rigid pattern can be held? Consensus in industry: No. A glance at the chart will show that wages have been going up steadily for more than a decade and that they rose even when we had controls during World War II. Labor now has heavy artillery to win increases in its near-control of the 18-man WSB. The six representatives of the public are certain to side usually with the six from the unions against the six from industry. That happened in the meat packing case when thin rationalization awarded the workers pay increases above the 10 per cent limit. The board has just granted another increase, to shipyard workers, that is above the 10 per cent limit because the January, 1950, rates were "out of line with their normal relationships."

A second course possible is complete capitulation to labor's wage campaign. That is as unlikely as the first because of disapproval by public opinion, strong opposition from price controllers and resistance by the industry segment on WSB.

The Odds Favor—Chances are a compromise between the first and second courses will be evolved. A clue to the precise direction destined for the compromise lies in WSB's approval of escalator clauses in wage contracts. WSB is drifting toward a pattern where all wages will be keyed to the cost of living. When the Bureau of Labor Statistics' consumer price index rises, wages will be permitted to climb accordingly, provided they are keyed in with the index at some base period, perhaps Apr. 15, 1951. Board members would like such a compromise because it would be fairly easy to administer. Nearly 200 labor contracts, each affecting 5000 or more workers, already have escalator clauses and could be simply adapted to the compromise pattern. Scores of other escalator contracts involving less than 5000 workers are also in force.

That pattern will be achieved by steps, not all at once. First step will be approval of many cases before WSB—regardless of whether the pay hike exceeds the 10 per cent formula—if the wage increase will not mean price boosts. And how will all the wage manipulation affect prices? Government planners hope the present price stabilization holds—at least until they can get the currently hotter wage issue patched up.

Peak Output in May

Steel production hits 9,094,000 tons, exceeding the previous high by 23,000 tons

STEEL production in May was a record 9,094,000 net tons, exceeding the previous high mark in March of 9,071,055 by nearly 23,000 tons, says American Iron & Steel Institute. The May production compares with 8,840,521 tons in April and 8,564,207 tons in May, 1950. But still there's a shortage.

The output of ingots and steel for castings in the first five months of 1951 was also higher than ever before at 43,614,444 tons, an increase of nearly 4.6 million tons or about 12 per cent over the similar 1950 period.

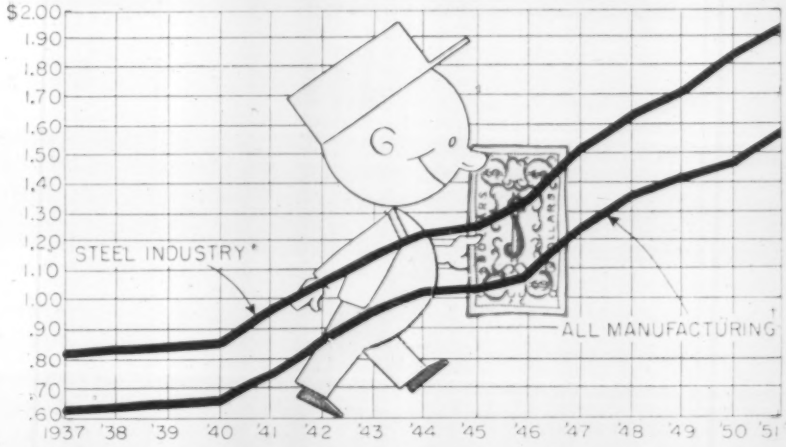
Steel Ingot Output

	1950	1951
Jan.	7,941,797	8,843,167
Feb.	6,803,032	7,765,701
Mar.	7,497,822	9,071,055
Apr.	8,224,504	8,840,521
May	8,564,207	9,094,000*
5 mos. Total	39,031,362	43,614,444*

*Preliminary figures

Steelmaking furnaces were operat-

Hourly Wages Go Up and Up



*American Iron & Steel Institute. †Bureau of Labor Statistics. ‡First Quarter.

Carl McDow

MILK RUN FOR *VICTORY*: Carrying 13,000 tons of iron ore 1000 tons more than shipbuilders had figured she could carry, *S. S. Cliffs Victory* arrives in Cleveland harbor after a record run from Marquette, Mich. The 620-foot addition to the Cleveland Cliffs Iron Co. fleet is the first ocean-going carrier to be rebuilt for use in Great Lakes ore trade

ed at an average of 102.7 per cent in May, compared with 103.1 per cent in April and 101.4 per cent in May, 1950. The April rate was the highest ever attained for an entire month, but its tonnage was exceeded in March and May because of one more working day in each of the latter two.

The weekly production in May averaged 2,053,000 tons, second only to April, when the revised average was 2,060,728 tons.

Ohio Works Expansion Complete

United States Steel Co. has all facilities at its Ohio Works in Youngstown operating after completion of a rebuilding program increased capacity of Number 5 blast furnace from 775 tons to 1100 tons.

The work included installation of two new turbo-blowers that will increase sharply blast furnace operations. Before, the plant had insufficient blowing capacity to work its six blast furnaces at a maximum rate. Equipment was also added to the open hearth department, where yearly ingot capacity is raised 140,000 tons.

Koppers Co. Inc. rebuilt Number 5 furnace, finishing the job in 120 days. Hearth diameter was increased from 17 to 25 feet; a skip bridge, hoisting and charging equipment were installed. The new turbo-blowers were made by Elliott Co., Jeannette, Pa., and provide 90,000 cubic feet of air per minute. Pumps for the blowers were made by Dravo Corp., Pittsburgh. Also added was a new cooling tower handling 43 million gallons of water each day.

Annual rated capacity of the six furnaces comprising the Ohio Works is now 2,003,000 tons.

U.S. Steel Sets Monthly Record

United States Steel Co. hit its all-time monthly record for production of steel ingots in May. That month 2,056,262 tons came from furnaces of the Pittsburgh and Chicago district plants. Also established was a new record in shipments, 1,588,814 tons of steel being shipped during the month.

Steel of Canada Expands

A new 4-furnace open-hearth shop is being built by Steel Co. of Canada Ltd. at Hamilton, Ont.

The ends of the furnaces will be of basic construction and the main roof of silica brick. Each furnace will have a nominal capacity of 250 net tons, with a maximum capacity of 275 net tons. Construction is now under way on foundations. The shop is expected to be in operation in the fall of 1952. A shop similar in construction is being built by Inland Steel Co., Indiana Harbor, Ind.

Northwest Gets First Strip Mill

Puget Sound area's first integrated strip steel facility is being built by Seidelhuber Iron & Bronze Works Inc. in Seattle. Initial installation, a 25-ton electric furnace, will be completed and ingots poured by August according to the schedule set by E. F. Shuck Inc., contractor.

The complete rolling mill will be installed and producing at an annual rate of 54,000 tons of strip by December, 1952, says Frank V. Seidelhuber Jr., president of the company's new rolling mill subsidiary. The mill works will employ 300 and be known as Seidelhuber Steel Rolling Mill Corp.

Site for the mill is a ten-acre tract on West Marginal Way, where rail and waterfront facilities are already in place. The mill plant will be one story, 60 feet by 240 feet; the rolling mill building also one story, 60 feet by 540 feet.

The mill will produce mild, hot-rolled steel strip, 3/16-inch to 16 gage thickness, in maximum width of 20 inches. Included is flash welding equipment making possible production of sheets in any multiple of the basic 20-inch strips. Size of the facility is to be doubled as soon as building materials become available.

Hanna Expands Furnace

Defense Production Authority has granted the Hanna Furnace Co. a quick tax write-off certificate for a $12 million expansion program at its Buffalo plant. The expansion is expected to include enlargement of one furnace now at the plant and possibly building a new blast furnace.

Bethlehem To Buy Labrador Ore

Hanna Coal & Ore Corp., a subsidiary of M. A. Hanna Co., has contracted with Bethlehem Steel Co. to deliver in excess of 30 million tons of Labrador-Quebec ores over a 25-year period.

That is the first major contract announced by the developers of the rich ore deposits in the Labrador and Quebec regions and is said to be the largest agreement of its kind ever made. Bethlehem is not in the combine of American steel companies that are helping to develop the region. They include Armco Steel Corp., National Steel Corp., Republic Steel Corp., Youngstown Sheet & Tube Co. and Wheeling Steel Corp.

Shipments of Hanna's ore to Beth-

lehem are expected to begin late in 1954, the approximate time when the first ore will be mined. Bethlehem will accept deliveries at Seven Islands on the north bank of the St. Lawrence river. It is believed that the contract price is based on the going rate for ore at the time shipments are made.

Republic Awaits Liberian Ore

Republic Steel Corp. expects its first shipload—10,000 tons—of Liberian ore this month.

To arrive at Baltimore, the shipment comes little more than two years after Republic purchased a large stock interest in Liberia Mining Co. Ltd. which owns a concession in the African country estimated to contain at least 25 million tons of ore assaying 68 per cent iron. The average analysis of Lake Superior ore is about 51 per cent iron.

Big Business in Atomic Energy

Nearly $500 million worth of subcontract business a year generated by some 11,000 prime contracts and purchase orders let by AEC

HAVE YOU tried the Atomic Energy Commission or its prime contractors as a defense contracting source?

AEC entered into nearly 11,000 prime contracts and purchase orders in the 12-month period ending last Mar. 31. Those awards generated nearly $500 million worth of business in 280,000 subcontracts and purchase orders during the period.

Big Business—By June 30 AEC will have an investment in plant and equipment close to $2.5 billion. That exceeds in gross book value of plant assets such enterprises as General Motors Corp. and Pennsylvania Railroad. By the time AEC's current expansion program is finished, expect an investment in plant and equipment of about $4.5 billion. Since inception of the atomic energy program in the U. S., the total amount appropriated to both the Manhattan District and AEC for both construction and operations comes to about $6.5 billion. The actual amount spent totals about $4750 million. The difference represents funds obligated, mainly for AEC's building program.

So, AEC is a giant. But Gordon Dean, AEC chairman, points out that 52 per cent of its prime contracts goes to businesses employing fewer than 500, about 41 per cent to larger firms and 7 per cent to educational and other institutions. Some 62.5 per cent of the subcontractors working with the primes were smaller companies, 36 per cent were large firms and 1.5 per cent were educational institutions and others. Today there are about 500 prime contractors and major subcontractors to the AEC who employ about 85,000 people. The government actually employs less than 5500 in the atomic energy program.

The Big Three—AEC's principal production contractors are Union Carbide Corp.'s Carbide & Carbon Chemicals Co., General Electric Co. and E. I. du Pont de Nemours & Co. Carbide & Carbon operates the U-235 production plant at Oak Ridge, Tenn. That plant cost $500 million to build and is being enlarged under a program that will eventually cost more than $200 million. It will be further supplemented by the new $500 million U-235 plant now under construction near Paducah, Ky. GE operates the plutonium production works at Hanford, Wash. A program there will eventually add more than $200 million to the original investment of more than $350 million in the plant. Du Pont will construct and operate the new $900 million production plant near Aiken, S. C. That plant is being designed to produce materials for fission weapons, hydrogen weapons or for fueling reactors.

Of AEC's 95 largest cost-type contracts of all kinds, 20 have gone to universities, 18 to chemical and minerals engineering firms, 16 to industrial design and engineering firms, 13 to people who provide services, 10 to construction firms, 8 to industrial research establishments, 5 to electrical equipment manufacturers and 5 to hospitals and such for research.

Steel Firms, Mines Bureau Join on Manganese Job

MEMBER companies of American Iron & Steel Institute are assisting the U. S. Bureau of Mines in operating an experimental blast furnace at Pittsburgh as part of a research program aimed at recovering urgently needed manganese from open-hearth slag.

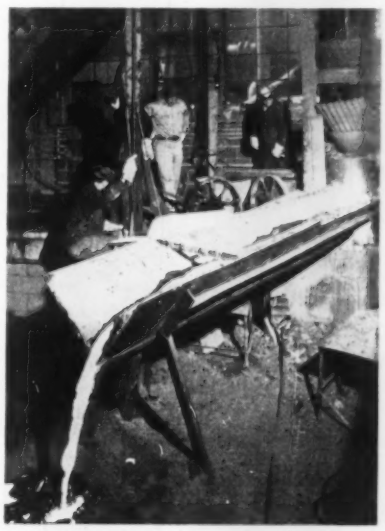
Aided by a federal appropriation and a $50,000 co-operative grant from the steel institute, the bureau has made two runs in the furnace. Detailed technical information for possible industrial use cannot be correlated until the furnace has operated for longer periods, says H. P. Greenwald, regional director of the bureau.

The Process—Waste slag from commercial open-hearths is being fed the experimental blast furnace along with coke and limestone or dolomite. Under favorable conditions, spiegeleisen containing 18 per cent or more manganese is produced. To remove impurities, chiefly phosphorus, the spiegeleisen must be treated further by blowing it in a basic-lined converter. That oxidizes the silicon and manganese in the metal and produces a desired slag containing 55 to 60 per cent manganese.

The high-manganese slag can be considered a synthetic ore with a greater manganese content than imported or domestic ores. As a final step, the high-manganese slag can be made into a product suitable for open-hearth steelmaking by treating it again in a ferromanganese blast furnace. That operation has been long established in the steel industry, with natural, high-grade ore as the feed.

Cut Off—Although the U. S. uses about 1.5 million tons of manganese ore per year in manufacturing steel, domestic production is less than 10 per cent. Russia once provided about 40 per cent of our requirements, but Soviet shipments now are practically nil.

Mr. Greenwald says that the U. S. produces some 13 million tons of open-hearth slag a year, 65 per cent of which is wasted. Some metallurgists believe 500,000 tons of manganese a year can be recovered economically from that slag if a suitable recovery process is developed. That total would represent about 70 per cent of the amount used in steel manufacture in the U. S. last year.



EXPERIMENTAL BLAST FURNACE
. . . the stream contains manganese

Hurry for Tool Pool

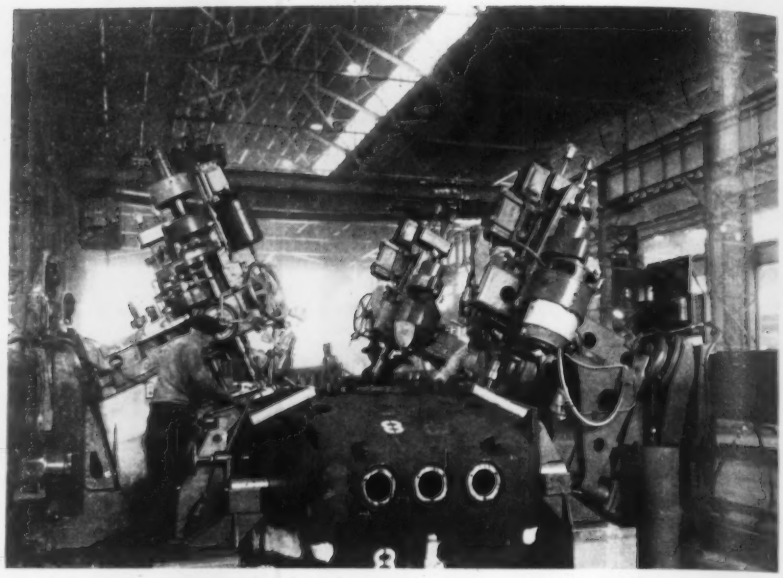
If you have a machine tool pool order, accept it quickly or you'll lose the job

IF YOU have a machine tool "pool" order from the General Services Administration which you have not yet accepted you must take prompt action if you want the business.

Reason for the need for haste: Money appropriated for pool orders but not allocated to definite orders will be lost for this purpose at the end of the fiscal year, June 30, 1951. GSA is preparing to cancel orders placed but not accepted, and award them to other firms.

Enough Money—National Production Authority is processing additional pool orders to be placed by GSA before July 1. These will be financed out of the third deficiency appropriation recently passed by Congress, but whether enough funds will be allocated to machine tool pool orders to complete the pool program still is to be decided. The pool program early this year came to about $450 million of which approximately $100 million has been placed to date.

Main cause of delay among machine tool builders who have received pool orders but not yet accepted them is the dissatisfaction with the Machinery price order, CPR 30, and the hope that objectionable restrictions in that order would be liberalized. Scuttlebutt talk at the Office of Price Stabilization is to the effect that the relief requested by the industry is to be granted soon—at least in part.



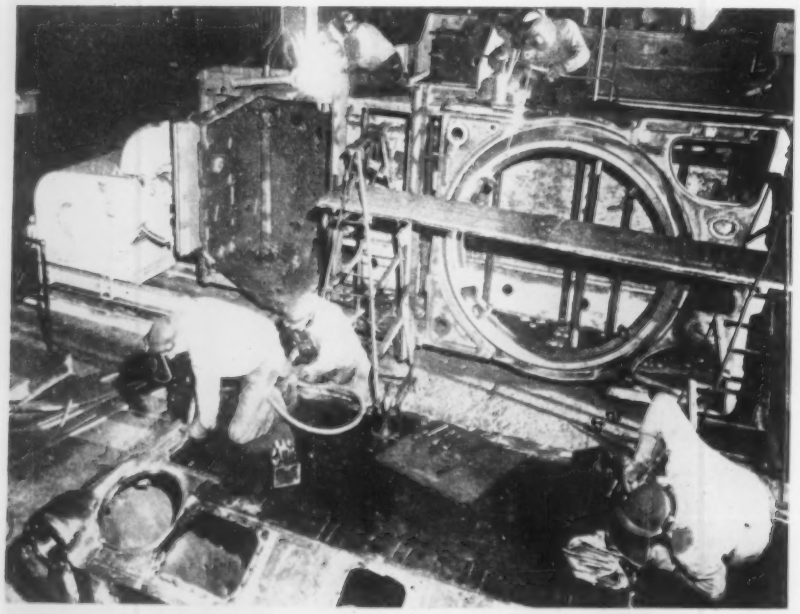
MULTIPLE HEAD DRILLING MACHINE AT WORK ON TANK HULL
. . . drilling slope sheets for suspension bracket bolts

Baldwin Shows Know-How in Tank Hull Output

BREAKING into the tank program early, Baldwin-Lima-Hamilton Corp. now has $60 million in government orders and by the end of this month will hit full stride in turning out welded hulls for M-47 General Patton tanks.

With its first order last August, Baldwin started renovating its Eddystone, Pa., steam locomotive boiler shop—unused because of conversion to diesel production. It decided to reduce all assembly work to fixture regulation to assure repetitive accuracy of parts assembly for welding without highly skilled workmen. Tooling up for first production was done with salvaged materials for makeshift jigs, fixtures and positioners. Many of the machine tools were rebuilt from units used for machining steam locomotive parts. Key personnel was selected and a working force of over 500 developed.

A good measure of the magnitude of the job: When completed with inside fittings, a tank hull weighs about 15 tons.



M-47 HULLS WELDED ON MOTOR DRIVEN POSITIONERS
. . . 800 pounds of weld metal go into each assembly

New Alloy Steel Set-Asides Set

Third quarter percentage set-asides of alloy steels for rated orders under Controlled Materials Plan are:

Product	Reserve Pct.
Ingots	50
Billets, projectile and shell quality	by negotiation
Blooms, slabs, billets	65
Sheet bars	5
Tube rounds	85
Wire rods	25
Plates, universal mill	75
Plates, strip mill	75
Bars, projectile and shell quality, 3" and over, round or square	by directive
Bars, hot rolled, including projectile and shell quality under 3" round or square	75
Bars, cold finished	60
Oil country goods, seamless	100
Mechanical tubing, seamless	85
Pressure tubing, seamless	85
Wire, drawn	25
Sheets, hot rolled	60
Sheets, cold rolled	60
Strip, hot rolled	40
Forgings	50

Mill Suppliers Meet

Manufacturers and distributors study defense problems at San Francisco

NEARLY 1700 manufacturers and distributors of industrial supplies trekked to San Francisco last week for the $6 billion industry's West Coast convention and conference booth program. Distributors were assured proper recognition in the defense program as a vital link in getting needed industrial supplies to industry by Franz T. Stone, outgoing president of American Supply & Machinery Manufacturers' Association, on leave from Columbus-McKinnon Chain Corp., Tonawanda, N. Y., as NPA assistant administrator in charge of industrial and agricultural equipment bureau. Further, Mr. Stone said: "NPA is trying to staff its divisions with such capable people that at section, branch or divisional levels businessmen will find a person who understands his problems and will be able to deal with them sensibly and quickly."

Civilian Output Continues — NPA has no intention of crippling production of civilian goods, and the auto industry, as example, can feel free to get out new models if it can do so with present equipment and other tools it is able to obtain.

Distributors report some items in tight supply and movng off shelves as fast as received from manufacturers. These include metal cutting tools, gages, twist drills and taps and dies. Other items such as grinding wheels and standard stock bushings are immediately available or can be obtained within two to three weeks.

As a group, manufacturers report new orders far above pre-Korean levels but a few lines such as electric hand tools actually are slow currently. This is blamed on switch to defense work and uncertainties under CMP, production being maintained in anticipation of greater demand by early fall.

Rollbacks are Problem—For manufacturers big problems are getting nickel-bearing steels and price rollbacks under ceiling price regulations.

Johnson Heads ASMMA — New president of the American Supply & Machinery Manufacturers' Association Inc. is R. M. Johnson, vice president, the Norton Co., Worcester, Mass. First vice president is J. A. Proven, Porter-Cable Machine Co., Syracuse, N. Y.; second vice president, T. D. Vander Voort, Clemson Brothers Inc., Middletown, N. Y.; and treasurer, J. Robert Kelley, Manning, Maxwell & Moore Inc., Bridgeport, Conn. Other officers and new executive committee members of the association are: Charles Jordan, vice president, Charles Parker Co., Meriden, Conn.; John Stites, assistant manager of sales, Cleveland Twist Drill Co., Cleveland, Robert Raymond, vice president and sales manager, True Temper Corp., Cleveland; and S. H. Cross, vice president and general manager, Stanley Electric Tool Division, Stanley Works, New Britain, Conn.

R. M. JOHNSON
. . . new president ASMMA

National Supply & Machinery Distributors' Association elected these new officers: President, W. A. Haseltine, J. E. Haseltine & Co., Portland, Oreg.; vice president for Areas 1 & 2, Harold E. Torell, Syracuse Supply Co., Syracuse, N. Y.; vice president for Areas 3 & 4, T. Gordon Vaughan, W. M. Pattison Supply Co., Cleveland; and vice president for Areas 5 & 6, J. D. Nicholson, The Mine & Smelter Supply Co., Denver.

New officers of the Southern Supply & Machinery Distributors' Association are: President, Wacker L. Wellford Jr., J. E. Dilworth Co., Memphis, Tenn.; first vice president, B. S. Barker, Pye-Barker Supply Co., Atlanta, Ga.; and second vice president, L. F. Perkins, the Henry Walke Co., Norfolk, Va.

Pace Quickens at Aberdeen

Research, development and testing of arms, ammunition, tanks and vehicles point way to more firepower for America. Captured Red weapons look inferior

BIG guns on the "main line" at Aberdeen Proving Ground in Maryland were quiet for the most part on a recent inspection trip of business magazine editors—in fact there was only one gun there. And out on the circuitous roads, hills and torture tracks of APG's Munson automotive test course there was complete quiet—no tanks, no trucks, no secret motorized weapons going through their back-breaking proofing. The rain may have had something to do with it, since Aberdeen's mud gets pretty gooey; and again it may be that the tempo of proof testing is more leisurely in comparison with the hectic days of, say, early 1943.

Inside Stuff—Indoors plenty was going on. Test models of guided missiles were giving up their aerodynamic secrets in the 15x20-inch throat of a supersonic wind tunnel where air at speeds up to four times that of sound was being pushed past them. In the ballistic research laboratories was shown the unbelievable ENIAC (Electronic numerical integrator and calculator) which through its 10,000 vacuum tubes and wire hookups makes series of calculations like firing tables in a matter of minutes where a corps of human calculators would take months, maybe years. It is already obsolete, the scientists in charge maintained. Also visited was the free flight test section, where projectiles are fired through a series of parallel apertures, at each one of which a camera is tripped automatically to picture the projectile as it passes.

Emphasis on Cold Tests—In the chemical and paint laboratory of the Development and Proof Services, technicians were attacking a variety of problems concerned with materials and finishes and their behavior at extremes of temperature, particularly the low end. There, cold rooms gave the answer to what would happen to various types of lubricants and brake fluids in arctic service. There also has been developed a new type of liquid plastic dip for protecting metal parts during shipment to and storage in the field. It can be applied at 100° F instead of 350° F which present types of dips require, sets up hard in a few minutes, is resistant to cracking and chipping at low temperatures.

In Aberdeen's museum of captured

enemy weapons were a few new additions picked up in Korea. There were also some Russian vehicles and tanks which, from a manufacturing standpoint, were decidedly inferior. Extensive use is made of castings on tanks, for example, even in such parts as bogie wheels, and most of them were amateurish examples of foundry technique.

Nazi Weapons Tough—Captured German weapons from World War II were spectacular. The heavy King Tiger tank was beyond anything this country has developed in size and firepower, although not many of them saw service. A twin-mounted 90-mm antiaircraft battery was an astounding example of German skill and ingenuity in massive armament. And so on down the line to a fiendish little self-propelled and electrically steered detonating charge with a 770-yard range. On one of Aberdeen's many plazas is another German piece de resistance Anzio Annie—a 10-inch high-velocity railroad gun which the Nazis somehow managed to roll up a track into the hills overlooking the Italian beach, from which position they managed to pinpoint oncoming Allied targets until the gun was silenced.

No new weapons, such as the .60-caliber machine gun with interchangeable 20-mm barrel, were unveiled by the Aberdeen brass. They preferred to concentrate on schooling and training activity, along with the various research and test facilities. Along the "main line", where the big guns are proof fired out over the bay, are a number of new cold rooms where it is possible to pull temperatures down to around −70° F. to see what happens to weapons and projectiles when they are fired at these temperatures.

Ft. Worth Exhibit Opens June 25

Armed Forces subcontracting exhibit moves into the southwest June 25, opening a five-day display in Will Rogers Coliseum, Fort Worth, Tex. This is the fourth exhibit designed to show small businesses components that military prime contractors will farm out.

Another clinic, identical in operation, is being held at the Seattle Naval Armory concurrently with the Ft. Worth show. Others are planned for Detroit and Los Angeles in September but definite dates and locations have not been set.

Another Plant for J-65

Buick Motor Division of General Motors Corp. will build a second big plant in the Flint, Mich., area for production of the Wright J-65 Sapphire Jet engine. The plant will have 1,600,000 square feet of floor space in two stories covering 27 acres. It is to be used in machining, heat treating, plating and sub-assembly of parts says Ival L. Wiles, Buick general manager and GM vice president.

Eight Firms Share Barge Awards

Contracts for construction of 102 deck-cargo barges by eight small businesses were awarded by the Navy Bureau of Ships at a cost of more than $2 million. The barges were contracted under package orders designed to be within the manufacturing capabilities of smaller size companies.

Awards are divided among the following companies: Kargard Boat & Engine Co., Marinette, Wis.; Jafra Inc., Miami, Fla.; Augusta Iron & Steel Works Inc., Augusta, Ga.; Gary Steel Products Corp., Richmond, Va.; Bushnell Steel Co., Jacksonville, Fla.; Central Steel Construction Corp., Buffalo; Bushnell-Lyons Iron Works, Tampa, Fla.; and Northeastern Boiler Works, Green Bay, Wis.

STEEL's Weekly Summary of Subcontract Opportunities

POTENTIAL SUPPLIERS, seeking word of possible opportunities to get defense subcontracts, should have a smoother job as a result of announcement by the Department of Defense that a limited number of quantity and dollar values will be available again on government awards within the next three weeks.

This partial release of award data, restricted since February, does not give small firms all the information they seek. It does remove much of the element of guesswork required in selecting subcontractable awards since the complete value blackout. Here's how the new policy works:

Publication of quantity and dollar values on unclassified negotiated and formally advertised contract awards between $25,000 and $250,000 is authorized. If an award exceeds $250,000, this fact will be indicated, but quantities will not be furnished. Reasoning of the Munitions Board is that small companies can now sort out the important contracts since those with supplier possibilities normally carry values of more than $250,000.

STEEL will continue to publish each week its summary of awards, using the added information to compile a more complete list of interest to the metalworking industry.

PRODUCT	CONTRACTOR
Truck-mounted Cranes	Hughes-Keenan Corp., Delaware, O.
Cranes	Reiger Equipment Co., Inc., Urichsville, O.
Cranes and Power Units	Gar Wood Industries, Findlay, O.
Mobile Airplane Crash Cranes	R. G. LeTourneau Inc., Peoria, Ill.
Pneumatic Hoists (trolley type)	Ingersoll-Rand Co., Phillipsburg, N. J.
Electric Chain Hoists	Yale & Towne Mfg. Co., Philadelphia
	Manly Div., American Chain & Cable Co., York, Pa.
Winches (mine sweeping—auto. towing)	Almon A. Johnson Inc., New York
Jack Assemblies	General Tire & Rubber Co., Akron, O.
	National Farm Machinery Co-operative Inc., Bellevue, O.
	Robert J. Zievers Inc., LaVerne, Calif.
Pumps	Ingersoll-Rand Co., Phillipsburg, N. J.
	Worthington Pump & Machinery Co., Harrison, N. Y.
Tractors	Worthington Mower Co., Stroudsburg, Pa.
	Industrial Tora Mfg. Co., Minneapolis
	Allis-Chalmers Mfg. Co., Milwaukee
	International Harvester Co., Melrose Park, Ill.
Tractors and Trailers	M-R-S Mfg. Co., Flora, Miss.
Trailers	LaCrosse Trailer Co., LaCrosse, Wis.
	Electric Wheel Co., Quincy, Ill.
	Eindal Mfg. Co., Albuquerque, N. M.
	Berdix-Westinghouse Automotive Air Brake Co., Elyria, O.
	Rogers Bros. Corp., Albion, Pa.
Trailers and Storage Racks	New Idea Div., Avco Mfg. Corp., Coldwater, O.
Scrapers	Gar Wood Industries, Wayne, Mich.
Rotary Sweepers	W. E. Grace Mfg. Co., Dallas
Road Rollers (motorized)	Huber Mfg. Co., Marion, O.
	Buffalo-Springfield Roller Co., Springfield, O.
Road Rollers (gasoline driven)	Galion Iron Works & Mfg. Co., Galion, O.
Road Rollers (tandem)	Tampo Mfg. Co., San Antonio, Tex.
	American Steel Works, Kansas City, Mo.
Earth Augers & Attachments	Buda Co., Harvey, Ill.
Semitrailers (stake and platform)	Miller Trailers Inc., Bradentown, Fla.
Aircraft Wheel & Brake Assemblies	Goodyear Tire & Rubber Co. Inc., Akron, O.
Fuel Booster Pumps	Pesco Products Div., Borg-Warner Corp., Bedford, O.
Metal Buildings & Hangars	Butler Mfg. Co., Kansas City, Mo.
Metal Buildings	Luria Engineering Corp., New York
Stand Assemblies	Meriam Instrument Co., Cleveland
Engine Analyzers	Sperry Gyroscope Co., Great Neck, Long Island, N. Y.
Motor Generator Sets	Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
	Crocker-Wheeler Div., Elliott Co., Jeannette, Pa.
Radar Sets	Radiomarine Corp. of America, New York
Rotating Frequency Converters	Electric Products Co., Cleveland
Frequency Meters	Lavoie Laboratories, Morganville, N. J.
Radio Receiving Sets	Electro Engineering & Mfg. Co., Detroit
Oscilloscopes	Tektronix Inc., Portland, Oreg.
Dynamotors	Pioneer General-E-Motor Corp., Chicago
Transformers	Jefferson Electric Co., Bellwood, Ill.
Transducers	Raytheon Mfg. Co., Waltham, Mass.
Headsets	Roanwell Corp., Brooklyn, N. Y.
R.F. Signal Generators	Federal Mfg. & Engineering Corp., Brooklyn, N. Y.
Voltmeters	Hervlett Packard Co., Palo Alto, Calif.
Separators	Electric Sprayit Co., Sheboygan, Wis.
Teletypewriter Switching Centers	Automatic Electric Sales Corp., Chicago
Teletypwriter Message Projectors	Helene Curtis Industries Inc., Chicago
Electric Typewriters	Ralph C. Coxhead Corp., Newark, N. J.
Duplicating Machines	Addressograph-Multigraph Corp., Cleveland

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U.S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Controlled Materials Plan

SMALL CONSUMERS—Direction 1 to CMP Regulation 1 gives manufacturers whose operations fall under the Controlled Materials Plan but who use only small quantities of steel, copper and aluminum in their production a simple method of obtaining needed supplies of those three materials, without applying to the government. Direction 1, issued June 8, 1951, states that a producer of a class B product not marked with an asterick in the Official CMP Class B Product List need not apply to NPA for controlled material if his quarterly requirements for its manufacture, and the manufacture of all other items in the same product class, do not exceed the following amounts of any of these materials: Carbon steel (including wrought iron), 5 tons; alloy steel (except stainless steel), 0.5 ton; stainless steel, none; copper and copper-base alloy brass mill products, copper wire mill products, copper and copper-base alloy foundry products and powder, 500 pounds; and aluminum, 500 pounds. Direction 1 authorizes him to use the allotment symbol SU (smaller user) on delivery orders for controlled material within the limits set. The quantity of B products he can turn out with the material so obtained, plus that in his inventory, will constitute his authorized production schedule. A producer who qualifies for this procedure is also authorized by the direction to apply the rating DO-SU to orders for production materials, other than steel, copper and aluminum, required to complete his schedule.

MATERIALS PRODUCERS — Direction 2 to CMP Regulation 1 authorizes producers of controlled materials to apply the rating of DO-PM to orders for production materials (other than steel, copper and aluminum) for use in producing controlled materials. Direction 2 was issued June 8, 1951.

ALLOTMENTS—Supplies of steel, copper and aluminum to provide for essential school, college, library, hospital and health facility construction have been authorized for delivery in the third quarter of 1951 under the Controlled Materials Plan. For hospital and health facility construction the amounts approved for delivery in the quarter beginning July 1 are: Carbon steel, 75,000 tons; alloy steel, none; stainless steel, 950,000 pounds; copper and copperbase alloy, 4.6 million pounds; and aluminum, 550,000 pounds. Amounts for school, college and library construction are: Carbon steel, 100,000 tons; alloy steel, 325 tons; stainless steel, 80,000 pounds; copper and copperbase alloy, 600,000 pounds; and aluminum, none.

Wide World

PROTECTION PLUS: This amiable GI manages a smile despite his heavy burden as he advances on the north central front in Korea. The 75-millimeter M20 recoilless rifle he is toting weighs 110 pounds

Know Your CMP

"A GUIDE TO CMP", a special report by the editors of STEEL, will be published with the June 25 issue of STEEL. This special section will contain the information you need to operate under the Controlled Materials Plan which becomes effective July 1. It will tell what CMP is, how it works, what you should do to obtain materials. It will contain the regulations and directions which are the structure of the plan. It will present questions most frequently asked about CMP—and the answers. In addition to all the pertinent information about CMP, presented for the first time between two covers, the Guide will contain a recapitulation of materials orders issued to date.

Reprints will be available through Readers' Service Department, STEEL, 1213 West Third St., Cleveland 13, O. Price: 50 cents a copy.

Materials Orders

CLOSURES — Amendment No. 1 to NPA Order M-26, effective June 7, 1951, specifies that alcoholic and certain non-alcoholic beverage drinks are in the class of products limited to 65 per cent of their base period use of aluminum caps.

IRON AND STEEL—Amendment of June 8, 1951, of NPA Order M-1 increases set-asides of iron and steel castings for defense-rated orders. Monthly set-asides of steel castings range from 75 to 80 per cent of the average monthly shipments in the first eight months of 1950. Previous set-asides were 20 per cent. Monthly set-asides of iron castings range from 60 to 65 per cent of the average monthly shipments in the first eight months of 1950. Previous set-asides were 20 per cent. The amendment also increases the required set-aside of standard and other carbon rails from 10 to 90 per cent of base period shipments.

MOLYBDENUM — Mineral Order 8 (MO-8) issued June 8, 1951, by the Defense Minerals Administration puts molybdenum concentrates under DMA allocation control after June 30, 1951. The order also restricts the use of molybdenum concentrates by producers. Government controls had already been placed on all molybdenum products except concentrates. The new order rounds out the allocation program for this metal.

NPA Delegations

CONSTRUCTION — Amendment of June 7, 1951, of NPA Delegation 7 names seven additional field offices of the Department of Commerce to which authority is delegated to administer NPA Order M-4 on construction.

CONSTRUCTION — Amendment of June 7, 1951, of NPA Delegation 14 delegates authority to eight government agencies to act on applications to commence construction of projects in certain categories under their jurisdictions.

Price Regulations

GCPR—The General Ceiling Price Regulation was republished June 7, 1951, to incorporate the text of Amendments 1 through 14. The regulation was originally issued Jan. 26, 1951.

ADJUSTMENT FOR LOSSES — Amendment 1 to General Overriding Regulation 10 of the Office of Price Stabilization permits manufacturers who are experiencing losses in the operation of separate plants or factories to appeal to OPS for upward adjustments of their ceiling prices. Amendment 1 was issued June 7, 1951, and was effective that date. Prior to this amendment, manufacturers could apply for relief under GOR 10 only if they experienced overall losses because of ceiling price regulations.

Windows of Washington

By E. C. KREUTZBERG Washington Editor

Small business will get a break if Congress approves an amendment to the Defense Production Act that will set up a Small Defense Plants Corp.

CHANCES are good that an amendment will be passed to the Defense Production Act which will prove a godsend to small business.

Introduced by Sen. John J. Sparkman (Dem., Ala.), chairman of the Senate Small Business Committee, the amendment would create a Small Defense Plants Corp. to act as a centralized, co-ordinated agency for getting defense business into the plants of small companies.

The Reason Why—The proposal results largely from testimony before the committee by smaller companies on difficulties they have in competing with large firms for defense business. Senator Sparkman says more and more small businesses must convert to war work or close down. He claims a negligible number of them so far have been able to get defense contracts. Small Defense Plants Corp. would have the power to: Certify qualified small plants to the procurement agencies for prime contracts; take contracts themselves, break them down for distribution among small firms; act as a claimant agency on materials for small plants; recommend for RFC loans small companies in need of funds for conversion, expansion, machinery and equipment to be used for defense or essential civilian production.

The bill is certain to receive favorable action by the Senate for Senator Sparkman introduced it with 55 cosponsors.

To the Rescue of Inventors . . .

Fight of the National Inventors Council to protect the rights of inventors who contribute to the national defense program apparently is producing results. The most important contracting agency, the Department of Defense, has created a committee to study the patent policy of the armed services; Secretary Marshall has designated Caspar W. Ooms, former patent commissioner, as consultant to this committee.

What caused the National Inventors Council to take to the warpath was the outrageous policy recommendation of the Justice Department that "where patentable inventions are made in the course of performing a government-financed contract for research and development, the public interest requires that all rights to such inventions be assigned to the government and not left to the private ownership of the contractors."

With the exception of the Justice Department, all interested agencies appear to support the National Inventors Council's thesis that invention can be encouraged only by recognizing the inventor's right to bargain for compensation for the use of his invention, and by protecting him against pirating on the part of the government or any other entity.

Closed-End CMP by Oct. 1?

IF CURRENT NPA thinking crystallizes as now expected, the Controlled Materials Plan will be broadened to cover the entire output of steel, copper and aluminum starting Oct. 1 instead of at the end of the year as earlier contemplated.

All requirements except those for consumer goods—that is, the items in the CMP Class B Products list that are marked with an asterisk—now are ready for programming under the CMP. NPA will send Form 4B to those manufacturers about July 1 so that they may be filled in with the tonnage requirements and returned by the end of July. That would give NPA time to determine whether or not to program requirements of consumers durables in the fourth quarter. Before July 1 will come more limitation orders on cuts in consumer durable goods production, so that manufacturers will be able to report their fourth quarter requirements.

First of the 40,000 Form 4Bs received from firms already under CMP were mailed back to the manufacturers last week, with the steel, aluminum and copper allotments indicated.

Technical Data Available . . .

Technical reports intended to help defense contractors solve problems of production are being made available free by the Office of Technical Services, Commerce Department, Washington 25, D. C.

The first two offered are "Selection, Care and Maintenance of Abrasive Wheels," and "Machining of Stainless Steels," identified, respectively, as Z1 and Z2. In addition, OTS will send free copies of technical reports prepared by the National Research Council of Canada: Z12, Adhesives and Adhesives; Z13, Casting of Metals in Permanent Molds; Z14, Casting of Metals in Plaster Molds; Z15, Decreasing Electrode Pick-up in Spot Welding of Aluminum Sheet; Z19, Planning the Gray Iron Foundry; Z21, Silver Plating; Z22, Spot Welding Electrical Peak Load; Z24, Welding of Stainless Steels.

OPS Defines "Casting" . . .

While it may take several more weeks before the Office of Price Stabilization will be ready to announce the ceiling price regulation on castings which is now taking shape, a basic decision of importance has been made as to the proposed regulation's coverage. It will apply to castings conforming to the following definition:

" 'Casting' means any product produced from molten metal or alloy which is formed in a mold or die and on which no further operations are performed, except cleaning, snagging, rough grinding, inspecting, testing, rough drilling, or machining only for the purpose of inspecting or cleaning. It also means any such product upon which further operations are performed, only if it is designed solely to meet the buyer's specifications, and is not generally offered for sale by the producer."

Thus, foundrymen will do their pricing under either of two regulations—the coming castings regulation, or CPR 30. CPR 30 will apply to castings which are final finished products sold widely in commerce, or when they are components in a product made by the castings producer.

Defense Boss Wilson Names Aide

Defense Mobilization Director Charles E. Wilson has appointed David D. Irwin as an assistant to the director to handle problems of metals and materials in the defense mobilization program.

Mr. Irwin retired in 1950 as vice president in charge of transportation and supply for Pure Oil Co., Chicago.

Fastener Makers Look to CMP

They hope the Controlled Materials Plan will put them in much better stead to handle the job of producing fasteners —the little titans of industry

IF CMP works only half as well this time as it did in the last war, it will wrench loose a tight materials situation in the vital fasteners industry. A good many fastener makers who think so cite, for example, the hard time they have had since early this year supplying all the bolts, nuts, rivets and screws for the expanded freight-car program. Last October's Supplement 1 to NPA's M-1 order did nothing to provide for the fasteners in the freight cars.

The oversight was no small one: A single hopper car requires 1200 pounds of rivets, 20 pounds of bolts. And freight cars are only one example of a defense or defense-engendered program that needs fasteners.

Hard Nuts To Crack—Herman H. Lind, president of the Industrial Fasteners Institute, Cleveland, thinks M-60 —an interim measure to provide steel for fasteners and other components till CMP reaches full effectiveness—is a turn in the right direction. CMP will be like a certified check to fastener makers—assuring them of allotments for materials. Knowing that, other manufacturers will not be duplicating orders for fasteners with many different companies. Hard-goods producers will eventually order more fasteners but in smaller quantities for delivery at a specific time. They will order according to their needs. M-60, in the meantime, is, as one fastener producer puts it, the "citation of essentiality."

Fasteners people like few others realize their product is vital in every industry. A public that looks at a modern telephone and can't see the 36 rivets, 16 screws and other fasteners in it, is not impressed. Government officials evidently weren't either —at first.

Fascinating Industry

Today about 30,000 people in more than 300 companies are heading, forming, cutting, threading, pointing, grinding the more than 200 million fasteners produced each day mostly of steel, much of nonferrous metals. Lock nuts, alone, one big specialty of the industry, are fabricated at over a 150-million-a-month clip. There are more than 400,000 different types and sizes of items that can be ordered from this business-by-the-billions industry. It expects to do a $535-million business this year. Dollar volume of business this April, latest month for which figures are available, was $42,600,000, 57 per cent above last April.

Fasteners Take of Steel Shipped*

	Net Tons	Dollar Volume (Millions)	Per Cent of Total Shipments
1946	1,054,717	$185	2.3
1947	1,293,027	$302	2.2
1948	1,284,653	$351	2.1
1949	874,594	$283	1.6
1950	1,410,011	$380	1.9
1951	1,600,000	$535	2.0

* Carbon and Stainless
† Estimated by STEEL

INDUSTRIAL FASTENERS—the unsung, steadfast partners in metalworking—are vital in every industry. Last month they were given "the citation of essentiality" by NPA's M-60 order. Only when CMP reached full effectiveness, though, do men in the industry think their major problem—materials—will be relieved. (The cover photograph, taken at the Bolt & Nut Division of Republic Steel Corp., shows a National Machinery Co. Bolt-maker; safety guard has been lifted for photographic purposes.)

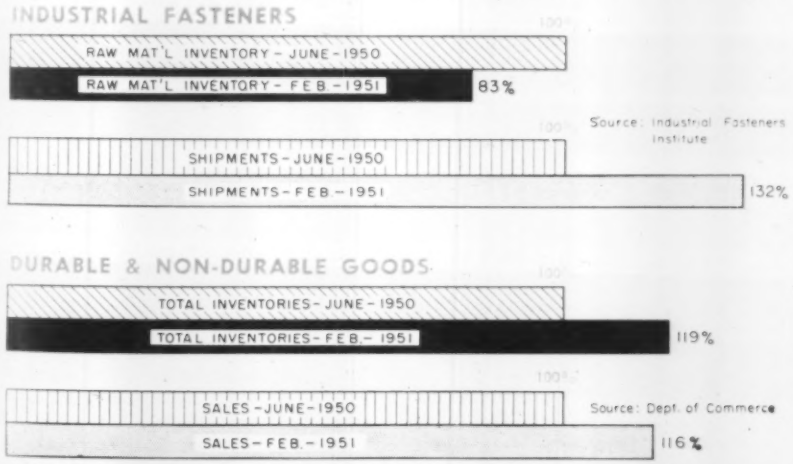
By and Large—The fasteners industry uses a little over 2 per cent of the steel produced (see table). About 25 per cent goes right back to steelmaking furnaces in the form of scrap. Product yield in the industry thus is, on the average, about 75 per cent and is steadily climbing. That still means well over a million tons of fasteners produced and shipped each year. The weight of bolts, incidentally, is approximately three times the weight of nuts shipped.

About 25 per cent of the fasteners funneling through distribution channels are for jobbers, mill supply houses, mail-order houses, and the like (millions of fasteners are used for repair and maintenance); the rest are used by hard goods manufacturers. Big customers, of course, are automakers, appliance companies, farm machinery builders, railroads.

Dimensions—The industry is a relatively stable one, and there is little cushion to its capacity. Expansion in it—if there were an allout war—would come through stricter materials controls, more high-production machinery, some rearrangement of production, faster materials handling. In an industry where interchangeability is essential (bolts made by one company must fit the nuts made by the another) there is a free interchange of information. Production and engineering men from one firm can be found visiting in a competitor's plant. Stiff competition and low profit margin (6 per cent would be considered high) do not detract from the interchange. Licensing of patented designs is another example of cross-fertilization. Interchangeability even crosses national boundaries: Standardization of screw threads by Britain,

Why Fastener Makers Want Controlled Materials

. . . inventory-shipment ratio—big cause of concern


INDUSTRIAL FASTENERS
RAW MAT'L INVENTORY - JUNE - 1950
RAW MAT'L INVENTORY - FEB. - 1951
83%
Source: Industrial Fasteners Institute
SHIPMENTS - JUNE - 1950
SHIPMENTS - FEB. - 1951
132%
DURABLE & NON-DURABLE GOODS
TOTAL INVENTORIES - JUNE - 1950
TOTAL INVENTORIES - FEB. - 1951
119%
SALES - JUNE - 1950
SALES - FEB. - 1951
116%
Source: Dept. of Commerce

Canada and the U. S. was accomplished in 1948. Work is being carried forward on widths and thicknesses of bolts.

Lamson & Sessions, National Screw & Mfg. and Russell, Burdsall & Ward are among companies carrying a full line of fasteners. Some are specialty houses like Tinnerman Products, Inc. which this year alone will make 3 billion of what it calls engineered fasteners. The company has developed about 5000 types and sizes for specific functions, develops an average of four new ones a day. National Screw, though it carries a full line, calls itself a specialist in specials. Republic Bolt & Nut Division, which emphasizes heavier fasteners (and foes a big railroad business) makes about 20,000 different types and sizes of bolts and nuts on its 2000 machines—boltmakers, nutformers, headers, etc. Besides it can handle 8000 specialty items.

A Billion Bolts—Employment in the industry ranges from fewer than 100 in the smaller plants to 2500 in a big outfit. Manpower needs of the industry are exacting: Many of the machines used in the manufacture of bolts are common only to that industry. It takes a long time for a man to learn to operate a header to set and adjust dies so metal flows smoothly. Holding onto men who know the trade is a must: They can't be found anywhere else.

Many plants are proud of the length of service of some of their employees: Republic recently retired a man after **54 years** of service during which time he produced over a billion bolts! Labor problems are on a par with the materials situation in a few plants. R. B. & W. thinks its roughest labor problem is at Los Angeles where the aircraft industry burgeons again. National Screw finds manpower supply is as worrisome as materials. C. P. McCabe of Republic sees a real problem rising in a shortage of supervisory personnel. Labor is important because about one-third of a fastener's cost, as a rule, is for labor.

Industry's Staples—The not-so-peculiar thing about fasteners is that they must always be available. The Munitions Board's Allocation Manual calls them "basic in nature or a potential bottleneck to wartime output of materiel."

Availability doesn't mean a warehouse full of fasteners. Not every plant can carry an inventory of 12,000 tons of bolts and nuts (Republic can and frequently does). And you just can't stock 150,000 different types and sizes (National Screw can make that many). Yet manufacturers of components of finished durable goods want fasteners when they need them. Most won't order until they *are* needed.

But the fastener industry today can take care of the varied demands made on it only by having the steel on hand to fill specific orders. Lead time is all-important. Theoretically, to ship a reasonably balanced carload in September, the bulk must be made in August at the latest. Of course, in many sizes, the shipment is augmented from the supplier's stockroom. But to fabricate in August means steel has to be on hand in July. Mills would have to roll bars or draw wire that month. But if they are to lay out an economical schedule, they must do so in June.

And so it goes back to the melting furnace. Actually, lead time must be greater.

Bolts in the Blue—Experience in World War II showed that 66 per cent of all fasteners went for defense needs, 34 per cent to civilian supply. The growing aircraft program—particularly jet engines—will take an increasing amount of the little titans of industry.

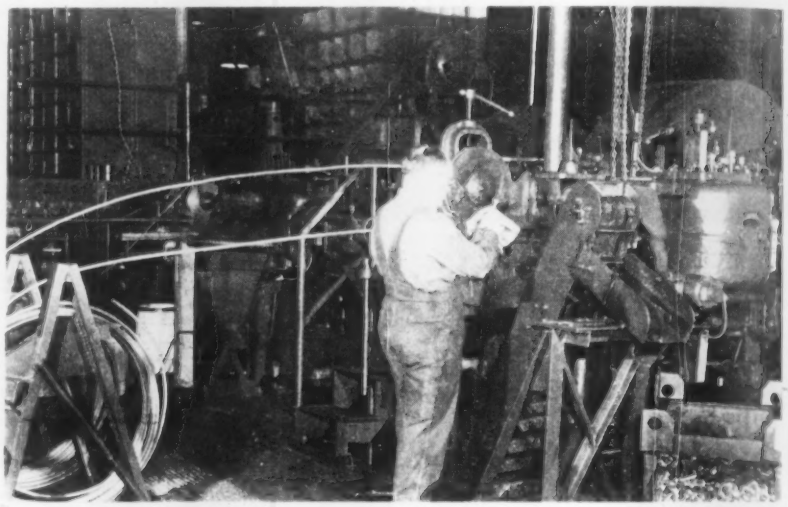
The new Allison J-35 jet engine, for instance, requires about twice as many fasteners as previous models. There are 101 different types of bolts—a total of 1617 used; 38 different nuts—1149 used; 32 kinds of studs—253 used; three types of rivets, 134 used; 233 screws of 28 varieties; and 19 clamps of 15 different sizes. That's 217 different types of fasteners for a total of 3435.

The statistical quality control standards (SQC) that are now being written into all Air Force contracts may have a big impact on the fastener industry as a whole since it may mean a revision of historical inspection techniques.

Lamson & Sessions is getting deeper into the defense program. Although its share of aircraft business in 1945 was a mere one-half of 1 per cent of its capacity, current aircraft business is 6 per cent and rising as fast as receipt of aircraft quality steel will permit.

As a whole, though, the fastener industry is just getting revved up to aircraft business. Many companies now are where National Screw and Lamson were in 1942. They had a big jump on others because they had started working on aircraft fasteners as far back as 1935-36.

One big problem in aircraft fasten-



BOLTS PILE UP AT REPUBLIC'S BOLT & NUT DIVISION
. . . shipment of bolts is about three times the weight of nuts

The Little Titans

Fastener producers, weighted down with defense business, don't want to see in this country what happened in Germany in the last war. There the German High Command failed to appreciate the necessity of fasteners—as was almost the case here—and drafted skilled labor, technicians and engineering talent freely. By 1944 the scarcity was realized — too late. Satchel couriers who picked up 100 or 200 pounds of bolts to rush to assembly lines had their counterparts in this country. One American firm got a call from Wright Field to deliver any quantity of an aircraft bolt (four of the type requested were necessary if a plane was to leave the ground). The evening after the order came through 1000 bolts were flying to the West Coast. The cost? 16 cents.

...ll be to satisfy the demand for ...ss and high-alloy product. Cold-...ng of stainless is a tough oper-...and alloy and stainless use un-...wartime conditions will run as ...as three times normal. Use of ...rous fasteners increases to a ...what lesser degree.

...sign demands for new high-speed ...raft prompted the National Aero-...ical Standards Committee to act ... development of a new high-...gth fastener stronger than cur-...t cowl fasteners. A meeting of ...tener makers brought agreement ... desired design features of such ... fastener—including envelope dimen-...ions, strength, torque and other re-...irements. Although some have al-...ady developed their designs, no ...action on a specification is expected ...until more development work on the ...basis of criteria established at the ...meeting is accomplished.

The Carriage Trade

The difference between today's fasteners and those produced in this country back in 1840 is vast. After the middle of the 19th century bolt and nut factories sprang up all over the East near the carriage trade.

In those days and for many years afterwards bolts were made of bar iron. Compared with open-hearth steel of today this "muck" bar, as it was called, was highly unsatisfactory—full of cracks and seams. Hot pressed nuts were then made from bar iron, mostly old iron rail. Development of screw machines, headers and automatic multi-station headers were forced on bolt and nut makers as the automobile replaced the horse and carriage.

Advance to Science—Development of the first automatic cold-header for bolts in 1847 pointed up the need for an accurate nut of comparable quality. Nut-making is a much more difficult and advanced science than producing bolts and screws. Shortly after the turn of the century came the first automatic machine for cold-punching nuts. Before that iron nuts had been cold-punched on hand-fed machinery. In 1907 came screws made from wire instead of bars. Around 1910 came the general switch from iron to steel stock. One old timer likened the change to a cabinet maker's change from soft pine to oak.

Today aircraft manufacturers, automakers and others demand and get fasteners of a wide variety of steel analyses. They want less weight, closer tolerances, more uniform tolerances, corrosion resistance, higher tensile and fatigue strengths, better finishes.

Principal bolt and nut machinery builders—National Machinery Co. and Waterbury Farrel Foundry & Machine Co.—furnish about 95 per cent of all the machines used by the industry. Both work closely with their customers on production problems. Says National Machinery: "We exist mainly to engineer and pioneer new machinery to carry out new methods—with a constant eye on material and labor savings." The company is in its 13th year of 55-hour workweeks.

Those machinery companies have from 18 to 24 months' backlog. Equipment operating in the fasteners industry is capable of handling most of the high-alloy work being demanded of it today, but the industry would like more machines sooner. Many of the jobs being done on equipment today are fascinating: Forging bullet cores, piercing extremely small rivets of precious metals, upsetting or heading specials formerly made on screw machines.

Some of the big advancements since the end of the war are: The National Cold Nut Former, application of the Boltmaker method to socket head cap screws and other special fasteners, a new method for making tubular rivets, new high-speed precision nut tappers, a broadened application of the multi-station progressive cold header to the making of a wide variety of jobs.

Builders of the machinery have been hard at work on increasing yield. For instance, on most of National Machinery's cold-forging equipment, generated scrap is less than 10 per cent. Many jobs on multistation progressive headers have no scrap; others no more than 5 per cent.

Brand New—Part of the history of the fastener industry is the war it has waged on vibration. Fifty years ago and more inventors offered many kinds of locking-type nuts, many impractical cost-wise and production-wise. Not so today. Big advances in such rudimentary locking methods as peening threads, using cotter pins or jam nuts are the new types of lock nuts. They are fabricated with a variety of materials (Nylon, for example) and use many ingenious techniques.

In the application of studs, cap screws and set screws—where no nut is employed—a means of locking the fastener in a tapped hole is frequently needed. Among methods developed for locking those fasteners are special thread forms and special head designs.

All the new advances fit into many industrial applications. More know-how, new basic patents, stronger materials, more productive machinery—better product and better practice, in short—indicate that the industry never will bolt the lid down on its huge chest of tricks.

20-Minute Survey

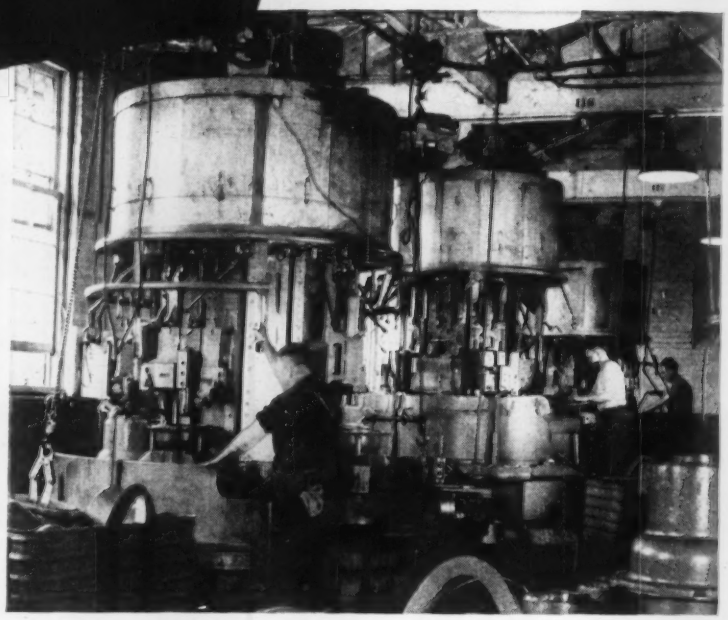
"WHY BOLTS AND NUTS?" That's the title of a 20-minute long-color film that Bethlehem Pacific Coast Steel Corp. will make available free of charge in June for showings by sales and service groups, business organizations, manufacturing associations, colleges, schools and other interested organizations. Modern methods employed at Bethlehem's bolt and nut plants in South San Francisco and Los Angeles, Calif., and Seattle, Wash., are shown in the film, produced by McAlpin Productions of Hollywood.

UNION PACIFIC DENVER SHOPS ARE ROLLING OUT FREIGHT CARS
. . . the bolts are laid out in readiness

Convincing

PROOF

of MANUFACTURING ECONOMY



Management of Massey-Harris of Canada, are proud of their Low cost production and of the Bullard Mult-Au-Matic with which this has been achieved. Starting with one Mult-Au-Matic as a trial, they now have seven.

A statement from this customer reveals that specifically they have:

Cut total machining cost on all parts, in some instances by as much as 90%.

Eliminated costly material handling.

Made possible turning out a much more uniform product.

In one case the Mult-Au-Matic has paid for itself in 14 months.

One job shows 6½ pieces per hour against the previous 1½ pieces.

Another job shows 72% savings while still a third showed 86½% savings.

This case study proves the value of Replacing Economically Dead Equipment.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

By H. C. TUTTLE Detroit Editor

Mirrors of Motordom

SAE evolves new formula for association meetings now that classified stamps put barriers of secrecy on technical developments with military applications

DETROIT

". . . TOP SECRET." Those classified designations on technological developments which have military applications threatened to put the hiatus on the summer meeting of the Society of Automotive Engineers.

SAE members are increasingly coming in contact with military specifications and doing work for the services. SAE had to solve this problem: How to present an interesting and informative meeting at its French Lick Springs, Ind., convention despite the new barriers of secrecy? The association handled the classified subjects this way: Put some sessions "off limits" to reporters and limited the attendance at another only to those persons who have been cleared by government agencies through the security classification "confidential."

Free Information—The open sessions dealt with the relative merits of automatic transmissions and torque converters, frame versus frameless bodies, cause of combustion chamber deposits, and power plant design.

The observation by one engineer that it is now costing some companies more to produce a syncho-mesh manually operated gearshift than an automatic unit is being cited as a reason for universal adoption of the latter much sooner than had previously been expected. Admitting that most automatic transmission devices increase gas consumption slightly, the group by and large is in agreement that this detraction is vastly offset by convenience and safety factors.

Not nearly as much agreement was noted among the automen when they came to consideration of the frameless car. Used by only Nash and Hudson, that type of construction has a number of advantages which the other automakers admire. It is rigid, it offers a possibility of overall weight reduction and simplification of assembly. But economic factors weigh heavily against its adoption on short notice by the rest of the industry. One guess was that $1 billion wouldn't cover the cost of retooling the body and assembly plants in the industry for the unit-type structure. The frameless design, however, has not been forgotten by the industry leaders, and might, with the big boys swinging their weight behind it, offer a cost-cutting method of passenger car production.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	658,918	505,593
March	802,737	610,680
April	680,257	585,705
May	681,643*	732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622

Week Ended	1951	1950
May 26	158,259	186,249
June 2	121,476	146,825
June 9	155,174	200,515
June 16	159,000*	204,704

Sources: Automobile Manufacturers Association, Ward's Automotive Reports. *Preliminary.

Needed: More Answers—On the subject of combustion chamber deposits, two formal papers and a panel discussion failed to produce answers to all the questions which the high-compression engine trend has generated. There is general agreement that the problems can best be met through co-operative effort by the automotive and the petroleum industries. It is denied by at least one automaker that there is a feud in progress between them, but the mechanical octane versus chemical octane question is undoubtedly uppermost in many minds.

Two speakers for the petroleum industry steered a middle course through this question. L. F. Dumont of the petroleum laboratory, E. I. Du Pont de Nemours & Co, and J. B. Duckworth, research department, Standard Oil Co. (Indiana), set forth in separate papers the mechanics of combustion chamber deposit formation and the effects of these deposits on octane requirement and power output.

Three Ways—Mr. Dumont listed three possible ways in which combustion chamber deposits increase the octane requirements of a given engine. The volume of the deposit itself is a sizable factor. By decreasing the volume of the cylinder the deposit raises the compression ratio and thereby increases the octane requirement. In general, he said, 20 to 40 per cent of the octane requirement increase is due to this factor. Catalysis is another possible cause, although on the basis of tests reported by him this does not appear as an important contributing factor, especially for leaded fuel deposits. However, more study will be required to confirm this. Thermal insulating properties of deposits appear to be a major cause of the increase in octane requirements, although the exact relationship has not been established.

Describing single cylinder engine tests on thermal insulating effects of deposits, Mr. Dumont told of evenly coating the combustion chamber with Teflon, a noncatalytic and a poor heat conductor. In these tests the octane requirement increased almost in direct proportion to the thickness of the film. Resulting change in volume accounted for 25 per cent of the increase, whereas 75 per cent was traceable to the thermal insulating effect of the Teflon film. An insulating coating only 0.011-in. thick on the cylinder head was found to increase the octane requirement 17 units.

Test Runs—Mr. Duckworth's presentation was on a less theoretical plane, involving the conclusions drawn from 170,000 test miles driven in six postwar cars using three controlled fuels, one unleaded, the others with tetraethyl lead in concentrations of 1 and 3 milliliters to the gallon. These tests showed that as a whole under typical passenger car use (20 per cent city, 50 per cent suburban, and 30 per cent intercity operation) combustion chamber deposits increase octane requirements by 8-12 units, irrespective of tetraethyl lead content.

They indicate that the deposits affect torque output in an inconsistent manner. After 10,000 miles of operation with unleaded gasoline one of the cars, significantly one with overhead valve arrangement, registered a gain in torque output of almost 6 per cent, but losses in torque as high as 9.4 per cent were recorded by others. He comments . . . "These results suggest that torque loss attributable to combustion chamber deposits is a more important factor with L-head engines than with overhead valve engines. Incorporation of au-

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tomatic or torque-responsive transmissions adds to the importance of this problem simply because satisfactory operation of these devices depends upon maintenance of design torque."

Golden Opportunity—To encourage automotive engineers to look sharper at their mechanical octanes and less at the chemical octanes they call on his industry for, he suggests that engine design is an extremely significant factor. It affords, in fact, "a golden opportunity" for designers to eliminate critical spots where small deposits can produce important ill effects. Combustion chamber deposits, he adds, probably are no more important with respect to octane requirements and possibly to performance than are other factors, such as change in ignition system characteristics.

To men who are not going to pioneer new engines, Mr. Duckworth also offers some food for thought. Operating conditions of the engine "exert a tremendous influence upon the formation of combustion chamber deposits."

A car that is driven predominantly in the city will accumulate deposits much more rapidly than one used in faster, less stop-and-start service. His advice: Purge the deposits formed from light-load operation occassionally with a sustained high-speed run.

Rare Bird—A rarity among technical papers—a humorous one—enlivened the discussion on Studebaker's new V-8 engine. Prepared by E. J. Hardig, T. A. Scherger and S. W. Sparrow, it states candidly that the engine "was promoted by a desire to benefit humanity in general and Studebaker stockholders in particular."

Despite that kind of levity and numerous references to the birth pains which accompanied the new design before it was brought forth, the paper is a significant one for its technical detail and explanation of the whys of the present design.

Had the engine been intended primarily as a basis for an SAE paper, the authors state, it would have included many unusual features. "Designed to push automobiles rather than to please audiences," the engine embodies few novelties. Its bore is 3⅜-inch, stroke 3¼-inch, with a piston displacement of 232.6 cubic inches, compression ratio of 7 to 1, brake HP of 120 at 4000 rpm. In its design, the engineers counted on a chain reaction—by "V-ing" the engine, a reduction in the length of the car was possible; this in turn reduced the weight. The aim was replacement of a six-cylinder power plant with an eight while allowing a price reduction and better performance.

Cause and Effect—Smaller combustion chambers, dictated by space requirements and compression ratio, "led us, somewhat reluctantly, to overhead valves." But these did not bring about inclusion of hydraulic valve lifters. "This omission," the Studebaker men say, "is due not to lack of appreciation of the merits of such lifters, but rather to lack of conviction as to their necessity." Instead are used a self-locking adjusting screw and a wire spring with the function of making the lifter follow the cam after the valve is seated. That arrangement was used in previous L-head engines. The first experimental models were built with the camshafts surface-hardened and the valve lifters untreated, the procedure followed with previous engines. Experimentally, this was fine. But camshafts built over production tools promptly "dug holes" in the valve lifter faces. By transferring the surface treatment from the shaft to the valve-lifter faces the problem disappeared.

They point out that the avenue is open for increasing the compression ratio of the engine to 8.5 to 1 merely by increasing the thickness of the piston head. Space of 7/64-inch is left below the top of the block should this change become desirable.

Inspection Standards Rise

Inspection requirements of parts produced for the military services traditionally are more exacting than those specified on parts with non-military applications. Some of the tolerances and tests demanded by Uncle Sam on parts produced by General Motors for his account include tank transmission parts accurate to 0.003-inch. Raw forgings for a jet engine part are rejected if off 0.001-inch, planet gears for the tank transmission can deviate not more than ½ ounce from their twins, welded tubing for jet engines is tested under water at 100-pound pressure.

Such accuracies and tests, however, are no longer completely foreign to normal manufacturing procedure (see cut). Quality consciousness has been an industry byword, and many plants have blossomed out with statistical quality control charts in the last six or eight months as the result of the quality drive.

INSPECTING THE INSPECTORS: Laid out in the gage room at Chevrolet-Detroit Gear & Axle are the 104 gages used in production and inspection of the steering knuckle for Chevrolet passenger cars

GM Builds Trial Jet Engine

A small experimental jet engine designed to deliver 300 horsepower is being built by General Motors Research Laboratories, it was disclosed by C. L. McCuen, general manager, last week. Purpose of this engine is purely to keep the corporation abreast of developments in this type of power plant. It will be installed in a bus when it is completed, some time in the next two years.

The problem of exhausting the hot gases has been solved satisfactorily with the temperature when they are passed into the atmosphere brought down to approximately 300 degrees. The exhaust opening, however, has an area of 3 square feet.

Mr. McCuen does not anticipate that this engine will topple piston-driven engines from their throne. For one thing, fuel consumption is high, about four times as great as reciprocating engines with the same power output. Cost of manufacture will also be exorbitant. For passenger car use, in fact, Mr. McCuen believes that the diesel offers a more practical answer than the jet. Neither, in his opinion, however, stands a chance in the foreseeable future of deposing the spark ignition engine.

Willys Makes History

A history-making vehicle with a promise of a spectacular life ahead was turned out of the Willys-Overland plant in Toledo this month. The four-wheel drive all-steel station wagon is the 135,000th to be built since its postwar introduction. It was presented to Yale University and Oberlin College for use in climatic research in Mexico and New Mexico.

The Business Trend

Industrial activity index follows pattern set ten years ago during similar period of building and tooling for defense production

DRAWING PARALLELS in industrial activity patterns is likely to be dangerous. But future trends sometimes can be unfolded by delving into the past for comparisons. Here are a few exerpts from these pages in STEEL, June 16, 1941: »

"Underlying strength of current demand for defense and civilian items is tremendous. . .new orders are still substantial. . .the problem is to meet increasing pressure on huge order backlogs already accumulated. . . tightening in metals and raw materials supplies is expected to be further accentuated in the months ahead . . .additional priorities and other controls are being brought into play."

Conditions 10 years ago were strikingly similar in many respects to those of today: At both times we were wading into the water of rearmament. Here's what happened to business in 1941: June was a month of peak operations. Activity was generally high and stable for the rest of the year, though there was a marked tapering off in auto production and manufacture of civilian hard goods. Capacity was being added at breakneck speed. Metalworking output gained momentum as tooling programs were completed. The trend in 1951 has been much the same, though volume is substantially higher. Whether activity in the rest of the year will follow in the same direction remains to be seen, but the weekly pattern is similar.

Significant of today's high demand for the products of industry is the encouraging rebound of the activity index from the temporary interruption during Memorial Day week. As was expected, the index climbed right back up to the high level it had maintained over the past few months and for the week ended June 9 settled at 217 per cent of the 1936-1939 average. In the prior week it was 203.

Steel Output Sets Record . . .

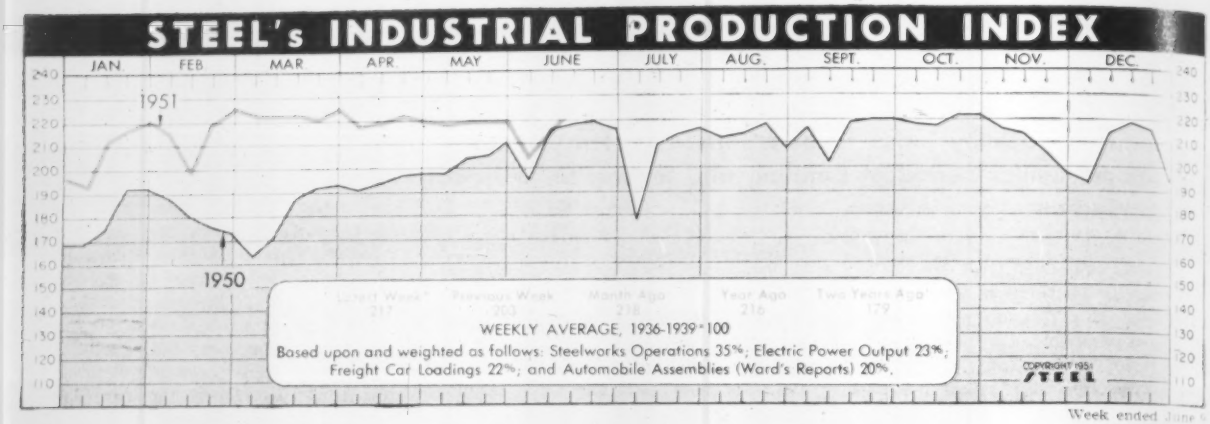
Steelmakers striving to keep up with current high demand are operating their mills well in excess of practical capacity but consumers are screaming for still more steel. American Iron & Steel Institute estimated the industry turned out ingots and steel for castings in the amount of 2,063,000 tons in the week ended June 16, duplicating output of the week before. May production of 9,094,000 tons beat the previous record set in March by 23,000 tons and was 253,479 tons over April's turnout. Totals for the first five months also ran higher than ever before: 43,614,444 tons, up 12 per cent over the similar 1950 period.

Auto Assemblies Up . . .

Automakers, carrying an increasingly heavier restrictive burden, expect June to be the last month to approach the half-million mark in assemblies for some time to come. *Ward's Automotive Reports* estimates the second quarter to add some 1,500,000 units to 1951's predicted 5½-million car turnout. June truck production should skid to 130,000 units, 10,000 less than were built in May. On the weekly scoreboard, U. S. and Canadian producers chalked up 155,174 passenger car and truck assemblies in the week ended June 9, says *Ward's*. This figure is a jump from

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	103.0	103.0	104.0	101.0
	Electric Power Distributed (million kilowatt hours)	6,734	6,445	6,567	5,921
	Bituminous Coal Production (daily av.—1000 tons)	1,437	1,626	1,618	1,768
	Petroleum Production (daily av.—1000 bbl)	4,168	6,169	6,162	5,305
	Construction Volume (ENR—Unit $1,000,000)	$296.0	$373.7	$294.8	$226.7
	Automobile and Truck Output (Ward's—number units)	155,174	121,476	158,502	200,515
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	815†	745	808	796
	Business Failures (Dun & Bradstreet, number)	172	132	181	164
	Currency in Circulation (in millions of dollars)‡	$27,520	$27,461	$27,315	$27,079
	Department Store Sales (changes from like wk. a yr. ago)‡	+5%	+3%	+8%	+5%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$16,922	$11,959	$14,717	$14,360
	Federal Gross Debt (billions)	$254.6	$255.0	$254.5	$256.2
	Bond Volume, NYSE (millions)	$13.1	$10.3	$14.9	$27.2
	Stocks Sales, NYSE (thousands of shares)	5,825	4,630	9,090	9,542
	Loans and Investments (billions)†	$69.4	$69.5	$70.1	$67.1
	United States Gov't. Obligations Held (millions)†	$30,443	$30,382	$30,836	$36,456
	†Member banks, Federal Reserve System.				
PRICES	STEEL'S Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.25
	STEEL'S Nonferrous Metal Price Index‡	239.1	241.1	242.3	184.1
	All Commodities†	181.9	182.5	182.8	157.6
	Metals and Metal Products†	189.3	189.4	189.6	171.7
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



Week ended June 9

the preceding week's mark of 121,476, but is well below the 200,515 assemblies in the comparative week of 1950.

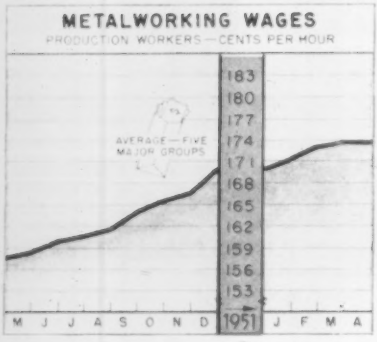
More New Plants . . .

New plant construction, with awards totaling $87 million in the week ended June 7, is now running at a pace well above the volume of 1950. Total building is 35 per cent above last year at this point, and private building is now outstripping public construction. Private housing awards for the above week, as reported by *Engineering News-Record*, were only $20.6 million, but May housing starts are reportedly up 9000 units over April. If this preliminary figure is correct, much of the wind will be taken out of the sails of those who oppose Regulation X which controls mortgage credit.

Total expenditures for new construction in May amounted to $2½ billion, says the Department of Commerce and Bureau of Labor Statistics. Industrial building accounted for $161 million, up 7.3 per cent from April and 120 per cent more than May, 1950.

Coal Miners Alarmed . . .

Trouble is brewing in the coal fields. Industry's use of the mineral is about 4 per cent higher than last year, but retail deliveries are way down. Slow demand has idled partially or completely more than half of Pennsylvania's miners. Even captive mines turning out types of coal still in relatively high demand have cut work schedules. Coke production has also taken a dip. The prevalence of short work weeks is caused by alarm over huge stocks above ground. On May 1 bituminous stocks on hand totaled 72 million tons, nearly double those of May, 1950. Cumulative output in the first five months of 1951 approximates 225 million net tons, up 15 per cent from 1950. Figures by the National Coal Association show 8,625,000 net tons were mined in the



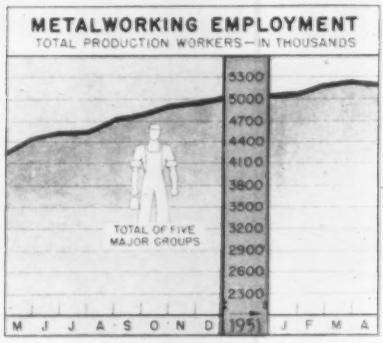
Metalworking Hourly Wages

(cents)

Production Workers—Five Major Groups

1950	Prim. Mtls.	Fab. Prod.	Mach. inery	Elec. Mchy.	Trans. Equip.
Apr.	160.9	148.8	156.9	144.6	170.6
May	161.5	149.6	157.6	145.3	169.8
June	163.0	151.5	158.3	145.1	172.7
July	164.5	152.2	159.5	146.4	172.8
Aug.	163.9	153.9	160.7	146.7	173.5
Sept.	166.9	156.1	162.6	148.5	177.0
Oct.	166.6	157.6	165.5	152.3	178.1
Nov.	168.4	158.7	167.6	153.8	179.0
Dec.	176.4	161.7	169.9	155.5	180.7
1951					
Jan.	178.9	162.4	171.3	155.5	179.4
Feb.	176.9	163.8	172.8	157.2	181.3
Mar.	178.5	165.4	174.6	158.4	183.2
Apr.	178.7	165.7	174.5	158.7	182.1

U. S. Bureau of Labor Statistics

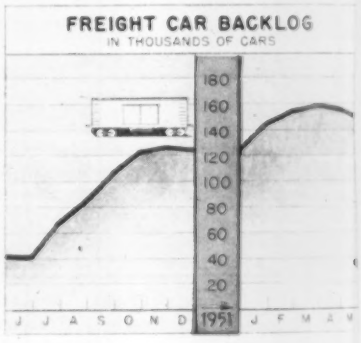


Metalworking Employment

Production Workers—Five Major Groups

1950	Prim. Mtls.	Fab. Prod.	Mach. inery	Elec. Mch.	Trans Equip.
Apr.	1,007	722	1,003	595	899
May	1,026	742	1,022	606	1,045
June	1,050	769	1,033	615	1,078
July	1,054	773	1,032	620	1,070
Aug.	1,086	814	1,060	655	1,118
Sept.	1,105	837	1,050	673	1,134
Oct.	1,117	850	1,104	710	1,157
Nov.	1,125	849	1,133	720	1,128
Dec.	1,142	852	1,163	724	1,160
1951					
Jan.	1,149	847	1,192	711	1,175
Feb.	1,153	853	1,219	716	1,228
Mar.	1,158	858	1,232	724	1,253
Apr.	1,160	852	1,242	722	1,208

U. S. Bureau of Labor Statistics



Freight Car Awards and Backlogs

	Awards 1951	Awards 1950	Backlogs* 1951	Backlogs* 1950
Jan.	26,356	9,376	144,758	19,029
Feb.	15,947	9,065	154,861	26,955
Mar.	11,271	6,201	158,619	30,539
Apr.	6,628	3,298	155,871	32,557
May	4,919	11,636	150,628	42,300
June	.....	2,095	.....	40,385
July	.....	30,065	.....	67,084
Aug.	.....	23,850	.....	86,156
Sept.	.....	25,111	.....	106,611
Oct.	.....	21,886	.....	122,148
Nov.	.....	10,573	.....	126,570
Dec.	.....	3,326	.....	124,459
Total		156,482		

* End of month

American Railway Car Institute

Charts—Copyright 1951

ended June 2, contrasted to ... 000 tons turned out the prior ... Adding to the woes of coal ... icers is a full-scale campaign ... scheduled by the fuel oil indus... to promote oil heating.

Inventory Buildup Brisk . . .

Manufacturers continued their brisk build-up of inventories in April says the Office of Business Economics. Total business inventories at the beginning of May were estimated at $68.7 billion. Book value was almost $1.9 billion over the prior month and about 75 per cent of this rise represented higher physical volume. Manufacturers' inventories jumped $1.3 billion to $37.7 million, while the balance of the rise was evenly split between retailers and wholesalers. The total rate of accumulation exceeded the previous high in March.

Prices Dip Again . . .

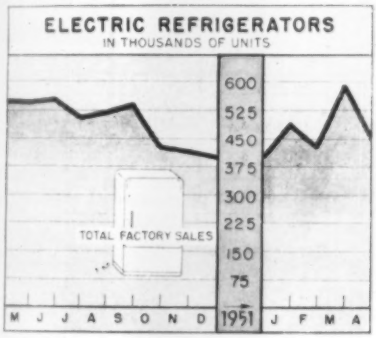
Wholesale prices are again on the downgrade—at least temporarily. Bureau of Labor Statistics' all-commodity index slipped to 181.9 per cent of the 1926 average in the week ended June 5, from a mark of 182.5 the previous week.

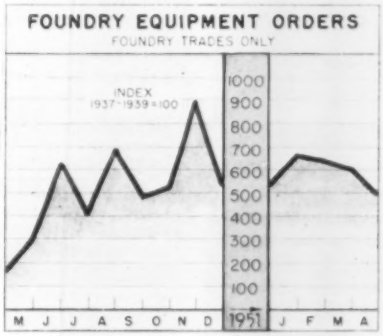
Trends Fore and Aft . . .

Freight car builders nearly reached their 10,000 car-a-month goal in May, when 9,774 cars were constructed. After being given free reign by the government to reach this peak, they will now have to cut back because of new steel curtailments. . .Rate of personal incomes reached $244 billion annually at the end of April. . . Department store sales in the price-warring New York district were up 18 per cent in the week ended June 2. . .Consumer installment credit outstanding dropped $69 million in April. In the same period last year there was an increase of $245 million. . . The nation's airlines are setting successive traffic records almost weekly . . .Preliminary estimates put the Federal Reserve Board industrial output index for May at 223 per cent of the 1935-1939 average, one point above April. . .Railway operating income was up nearly 14 per cent in April.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction	May28	Indus. Production	May21	Ranges, Elec.	June11
Durable Goods	May7	Ironers	May14	Ranges, Gas	June4
Employ., Steel	June4	Machine Tools	May7	Steel Castings	May28
Fab. Struc. Steel	June4	Malleable Castings	May28	Steel Forgings	June11
Furnaces, Indus.	May21	Prices	May14	Steel Shipments	May21
Furnaces, W. Air	May28	Purchasing Power	June4	Vacuum Cleaners	June4
Gear Sales	June11	Pumps, New Orders	June11	Washers	May14
Gray Iron Castings	May28	Radio, TV	June11	Water Heaters	Apr.30





Electric Refrigerators

Total Factory Sales—Units

	1951	1950	1949
Jan.	488,607	375,856	396,329
Feb.	423,420	461,256	348,539
Mar.	591,449	586,293	382,861
Apr.	445,636	546,279	335,092
May		542,865	341,933
June		549,740	310,780
July		507,029	327,429
Aug.		518,359	314,839
Sept.		535,002	326,149
Oct.		420,431	265,575
Nov.		411,201	230,258
Dec.		394,268	272,636
Total		5,848,579	3,852,420

National Electric Mfrs. Assoc.

Foundry Equipment Orders

	Index		Value in Thousands	
	1951	1950	1951	1950
Jan.	668.0	159.3	$3,075	$731
Feb.	638.6	113.1	2,940	518
Mar.	599.0	225.2	2,758	1,034
Apr.	490.1	160.6	2,256	737
May		294.9		1,353
June		622.7		2,858
July		401.8		1,844
Aug.		693.6		3,183
Sept.		483.8		2,220
Oct.		526.8		2,417
Nov.		885.5		4,077
Dec.		526.2		2,425

Foundry Equipment Mfrs. Assoc.

specialists in

CMP THINSTEEL

These three steel warehouses normally carry in stock the complete range of cold rolled strip steel specialties made by The Cold Metal Products Company, including low carbon and high carbon analyses, tempered spring steel and stainless grades in the 300 and 400 series. Supply problems are now very difficult. Currently, shortages exist in some grades and sizes, but within the limits of inventory possibilities strip steel fabricators continue to find justification for the descriptive phrase long identifying all Precision produced CMP products—"More feet per pound—more finished parts per ton."

IN THE EAST IT'S THE KENILWORTH STEEL CO.
Located in the metropolitan New York area for quick service throughout the east. 750 Boulevard, Kenilworth, N. J. Phones: New York—COurtlandt 7-2427; New Jersey—UNionville 2-6900.

IN THE MIDWEST IT'S PRECISION STEEL WAREHOUSE, INC.
Well known in the Chicago district for good service and careful attention to customers' requirements. 4409-4425 West Kinzie Street, Chicago 24, Illinois. Phone: COlumbus 1-2700.

IN THE FAR WEST AND PACIFIC COAST IT'S THE COLD METAL PRODUCTS CO. OF CALIFORNIA
On the west coast the only specialists in light gauge precision cold rolled strip. 6600 McKinley Avenue, Los Angeles, California. Phone: PLeasant 3-1291.

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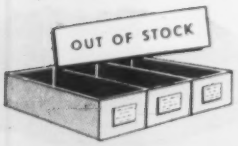

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Do as thousands have done... switch to SPEED NUTS

As shortages of critical materials increase, keep in mind that you can count on *immediate delivery* of C7000 Flat Type SPEED NUTS.

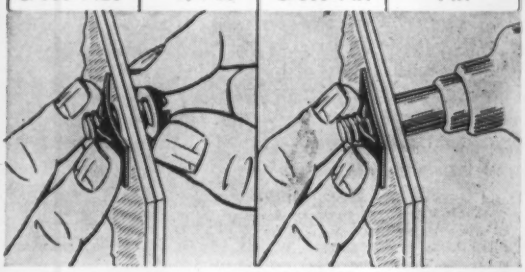
Far from "substitute" fasteners, SPEED NUTS have proved their superiority on production lines across the board of industry.

They can be applied much faster, eliminate assembly steps, and provide maximum holding power *at minimum cost per fastener.*

Sketches at right show how easily the SPEED NUT is started, and how they are tightened in an instant with power driver or screwdriver. No pliers, no wrench needed to hold NUT as it is tightened. Write today for samples and data. TINNERMAN PRODUCTS, INC., Dept. 12-A, Box 6688, Cleveland 1, Ohio. In Canada: Dominion Fasteners Ltd., Hamilton. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales.

for MACHINE SCREWS—TAPPING SCREWS

PART No.	SCREW SIZE	PART No.	SCREW SIZE
C7000-436	4-36	C7000-4A	4A
C7000-632	6-32	C7000-6A	6A
C7000-832	8-32	C7000-8A	8A
C7000-1024	10-24	C7000-10A	10A
C7000-1420	1/4-20	C7000-14A	14A



TINNERMAN *Speed Nuts*®

FASTEST THING IN FASTENING

Men of Industry

ROBERT F. GALVIN
. . . president of Ohio Steel Foundry

W. B. CALDWELL
. . . heads divisions at Borg-Warner

MICHAEL EGAN
. . . div. sales mgr., Supreme Products

Ohio Steel Foundry Co., Lima, O., elected as officers: **R. F. Galvin,** president, **T. H. Harvey,** vice president, **E. A. Walcher,** vice president, **W. P. Dudley,** secretary-treasurer, **F. C. Bowman,** assistant treasurer, and **E. F. Buchanan,** assistant secretary. **John E. Galvin,** former president, was elected chairman of the board. He retired from the presidency after 33 years in that capacity.

C. E. Witt was appointed district sales manager for the Pittsburgh district of the Wright Hoist and Ford Chain Block Divisions of **American Chain & Cable Co. Inc.,** with headquarters in Pittsburgh.

Archie M. Marsh was appointed manager of sales at St. Paul for **American Steel & Wire Co.** He succeeds **D. R. Waterman,** retired. **E. E. Louis,** assistant to the company's vice president-sales, has retired after 39 years of continuous service with this U. S. Steel subsidiary.

Arch J. Cochrane was appointed assistant manager, Chicago district operations, **Youngstown Sheet & Tube Co.**

L. M. Evans was placed in charge of the new Rochester, N. Y., branch office of **Worthington Pump & Machinery Corp.,** which is located at 1246 Sibley Tower Bldg.

National Supply Co., Pittsburgh, announces creation of two sales divisions with headquarters in Fort Worth, Tex., and Houston. The southwest division, Fort Worth, is in charge of **James M. Thompson.** The Gulf Coast division, Houston, will be managed by **John W. Babb.**

W. B. Caldwell was elected president of **Borg Warner Corp.'s** Calumet Steel Division, Chicago Hts., Ill., and Franklin Steel Division, Franklin, Pa. He was vice president and general manager of both divisions. Prior to Mr. Caldwell's election, **Roy C. Ingersoll,** president of Borg-Warner, had also held the presidency of the two divisions.

Kennametal Inc., Latrobe, Pa., appointed **William M. Stoll** as mining engineer, with duties of locating and procuring minerals that constitute basic materials essential for production of cemented carbides used in tools for metalworking and mining.

Lockheed Aircraft Corp., Burbank, Calif., appointed: **G. A. Fitzpatrick** production manager; **C. S. Wagner,** manufacturing engineer with supervision over both tool engineering and plant engineering; **Steven N. Bean,** chief tool engineer; **Ralph J. Swonk,** plant engineer; **E. H. Farmer,** manager of manufacturing control, a new unit handling work previously assigned to industrial engineering and production control; **William Shulver Jr.,** director of materiel with responsibility for all buying, storing and delivering; and **George Prudden,** director of inspection.

Gen. Lucius D. Clay was elected a member of the board of **General Motors Corp.,** Detroit.

Fred J. Lemkau was appointed manager of the Buffalo sales office of **American Radiator & Standard Sanitary Corp.,** succeeding **Calvin W. Hewlett,** who was named manager of the Pittsburgh sales office.

Michael Egan was appointed sales manager of the chuck division of **Supreme Products Inc.,** Chicago. He had previous association with Skilsaw Inc., and for the last three years was assistant sales manager of Cummins Portable Tool Co.

Carl W. Nedderman was elected vice president of **Edward Valves Inc.,** East Chicago, Ill., subsidiary of Rockwell Mfg. Co. He was at one time president of Universal Camshaft Co., Muskegon, Mich.

Richard F. Baley was named sales engineer for **American Fire Clay & Products Co.,** Canfield, O. He was with Ferro Machine & Foundry Co. as a metallurgist, and later joined Illinois Clay Products Co. as a sales engineer.

Kaiser Steel Corp. appointed **Thomas G. Simison** division superintendent of tin plate rolling mills at Fontana, Calif., plant. He is succeeded as assistant superintendent in the merchant mill by **Reynold C. McDonald.** Named assistants to **William Keirn,** superintendent, cold rolling mill and tin plate mill, are: **Dale Miller,** formerly assistant superintendent of cold rolling at Kaiser Steel Corp.; **Harry Reading** from Weirton Steel Corp.; and **Walter Dettman** from Youngstown Sheet & Tube Co. **Roger Barnes,** formerly foreman at the Sparrow's Point, Md., tin mill of Bethlehem Steel Corp., was appointed general foreman of the new tin mill. **Joseph Lencioni** was appointed assistant superintendent of cold rolling, replacing Mr. Miller.

Arthur F. Allen was promoted to

chief engineer, **Safway Steel Products Inc.**, Milwaukee.

Promotions at the Youngstown operations, **U. S. Steel Corp.**, include: **Roy L. Leventry Jr.**, superintendent of the maintenance shops, transferred to the new Fairless Works at Morrisville, Pa. **Harold P. Round**, assistant superintendent, maintenance department, appointed to succeed Mr. Leventry. **Dana F. Mosier**, assistant superintendent of the McDonald maintenance shops, named to succeed as assistant superintendent of the whole department. **George Grishkat** replaces Mr. Mosier at McDonald. **Harry Davis** was named superintendent, service department, and **James McClymonds** replaces Mr. Davis as assistant superintendent. **Thomas Gleason** was named assistant superintendent of the operating maintenance department.

Richard A. Kelting was appointed manager of the new Newark, N. J., sales office of **Falk Corp.**, established to serve the northern half of New Jersey.

Frank Senior and **David Knall** have joined **Karl Juengling**, consulting engineer of Cleveland, to form **Senior, Juengling & Knall Co.** The new company will function as engineer and consultant to the iron and steel industries and will have offices in the Brown-Marx building, Birmingham, and the Rockefeller building, Cleveland.

Cooper Alloy Foundry Co., Hillside, N. J., appointed **Herbert J. Cooper** as general manager. **R. J. O'Connor** was promoted from manager of standards to foundry superintendent, and **John J. Ford** was promoted from time-study engineer to succeed Mr. O'Connor.

JOSEPH A. RIGBY
Brooks Oil V. P.

HENRY W. WINKLER
Brooks Oil V. P.

Joseph A. Rigby and **Henry W. Winkler** were named vice presidents of **Brooks Oil Co.**, Pittsburgh. Mr. Rigby will be in charge of engineering and sales, and Mr. Winkler will be in charge of research and laboratory control.

C. M. Maratta was appointed chief consulting engineer of **Timken Roller Bearing Co.**, Canton, O. **R. A. Schimpf** was appointed chief works engineer, **H. J. Urbach** as executive engineer, and **L. A. Holder** as chief mechanical engineer.

Elected to the board of directors of **York Corp.**, York, Pa., are: **John R. Hertzler**, vice president and general sales manager; **J. Keith Louden**, vice president and assistant to the president; and **E. P. Vanderwicken**, vice president and treasurer.

Alan Irwin was appointed manager, Detroit division, **General Box Co.**

C. F. Myers, former sales manager, was elected vice president and sales manager of **Morse Twist Drill & Machine Co.**, New Bedford, Mass. **A. L. Carr** continues as vice president and director of sales.

H. J. Kreher was appointed assistant manager, railroad, pig iron and chemical division, **Inland Steel Co.**, Chicago. He formerly was Chicago manager of Reilly Tar & Chemical Corp.

Richard J. Bakewell was named sales representative for the Philadelphia district of **National Supply Co.'s** Spang-Chalfant Division. He formerly was a Pittsburgh representative of National Foundry Association.

James L. Myers, president, Cleveland Graphite Bronze Co., begins his third term as president of **Associated Industries of Cleveland. H. C. Erskine**, works manager, Aluminum Co. of America, was elected AIC vice president to succeed **A. E. Gibson**, president of Wellman Engineering Co. **Claude E. Murray**, executive vice president, Willard Storage Battery Co., was re-elected treasurer.

Arnold M. Wolf was appointed vice president in charge of manufacturing

HERBERT J. COOPER
gen. mgr. of Cooper Alloy Foundry

C. F. MYERS
V. P. and sales manager of Morse

ARNOLD M. WOLF
Lewyt Corp. V. P.-mfg.

of Lewyt **Corp.**, Brooklyn, N. Y. He has been works manager since 1942.

Promotions at the **New Departure Division**, Bristol, Conn., General Motors Corp., include: **Seth H. Stoner,** general works manager; **Frederick J. Garbarino,** chief engineer; **Alfred F. Herold,** general manufacturing manager; **John J. Curry,** assistant to general works manager on special assignments related to defense efforts; **George A. Smith,** manager of production engineering; **Robert T. Collins,** Meriden, Conn., plant manager; **William J. Ryan,** Bristol, Conn., plant manager; **Hubert J. Gurske,** Sandusky, O., plant manager; **Edwin H. Goodridge,** general production manager in charge of production and purchasing; **Harry T. Burgess,** Bristol plant production manager; **Matthew C. Wagner,** Meriden plant personnel manager; **Harry D. Hall,** divisional supervisor of processing; **Kenneth D. Mackenzie,** assistant Meriden plant manager; **Henry J. Michelsen,** master mechanic; **William T. Murden,** coordinator of defense activities; **Edward E. Gill,** director of public relations.

John M. Dolan, vice president and general sales manager, **Hydraulic Press Mfg. Co.,** Mt. Gilead, O., was appointed to the company's board of directors.

Alan Howard was appointed operation manager, gas turbine division, **General Electric Co.,** Schenectady, N. Y., and **J. P. Keller** is assistant operation manager. **John T. Holleran** is manager, Ft. Edward and Hudson Falls operations, transformer and allied product divisions at Ft. Edward, N. Y. **Dr. Louis T. Rader** is assistant manager of engineering, control divisions, and **Richard S. Walsh** is manager, induction motor sales division, small and medium motor divisions.

LEONARD V. BEDELL
. . . joins Sierra Electronic Mfg.

Leonard V. Bedell, general manager at Litton Industries, becomes general manager of **Sierra Electronic Mfg. Co.,** producer of electronic dynamic pressure-measuring equipment, and vice president of Electronic Engineering Associates Ltd., San Carlos, Calif., application-engineering representative for Sierra products.

Janette Mfg. Co., Chicago, elected **W. H. SaLee** as vice president. General sales manager for the last year and a half, he has been with Janette Mfg. in various capacities for 26 years.

Appointed sales representatives for **Hynes Steel Products Co.,** Youngstown, and the Roll Formed Products Co., subsidiary, are **Walter W. Scott,** covering southeastern Ohio, and **Donald K. Shuck,** New York state.

Merle A. Miller, treasurer of **Joseph T. Ryerson & Son Inc.,** Chicago, was elected a director and a member of the executive committee.

E. R. Leeder was promoted from vice president to executive vice president, and continues as a director of **Gar Wood Industries Inc.,** Detroit. **J. W. Considine,** assistant to the president, was elected secretary and a director succeeding **Milton W. Kleckner,** who is returning to the practice of law. Mr. Considine also became treasurer succeeding **John B. Gray,** resigned. **Angus J. O'Brien** was elected vice president-director of manufacturing, and **R. G. Hostetter** was named director of industrial relations. **John W. Corcoran** was elected assistant treasurer in addition to continuing as credit manager.

Wagner Bros. Inc., Detroit, appointed **William Young** district sales manager for its southern Ohio territory, including Cincinnati.

Earl E. Bradway was named general manager of DeJUR-Amsco Corp., Long Island City, N. Y. He resigned as president of Colgate Mfg. Corp. to accept this position.

James V. Donohue was appointed vice president-sales, **Mixing Equipment Co. Inc.,** Rochester, N. Y. He was sales manager.

John L. Wilson, vice president and director of Anheuser-Busch Inc., was elected a director of **Mack Trucks Inc.,** New York.

G. Allen Spaulding was made production superintendent of the **B. F. Goodrich Co.'s** Miami, Okla., tire plant to succeed **William L. Carpenter,** named manager of the tire plant in Oaks, Pa.

Swenson Evaporator Co., division of Whiting Corp., Harvey, Ill., has added **William F. Scanlan** to the staff of the Houston district sales office.

Arthur F. Schroeder has been named manager of the new Newark, O., plant of **Timken-Detroit Axle Co.** He was assistant factory manager of its Wisconsin Axle Division at Oshkosh.

OBITUARIES . . .

Wilfred C. Owen, 57, president of **Detroit Steel Products Co.,** Detroit, died June 8. He was associated with the company 37 years, and became its head in 1949.

Edward L. Clair, 56, president of **Interlake Iron Corp.,** Cleveland, died June 13. He became president in 1949 and had been associated with the corporation since 1920.

John M. Hopwood, 67, chairman of the board of **Hagan Corp.,** Pittsburgh, and its subsidiaires, died June 8.

L. F. R. Bellows, 69, president, **Bellows Co.,** Akron, manufacturer of pneumatic equipment, and Bellows Electric Sign Corp., died May 28 at Detroit.

Harold G. Rowley, 49, purchasing agent for **Borg-Warner Corp.,** died June 6 at his home at Grosse Pointe Farms, Mich.

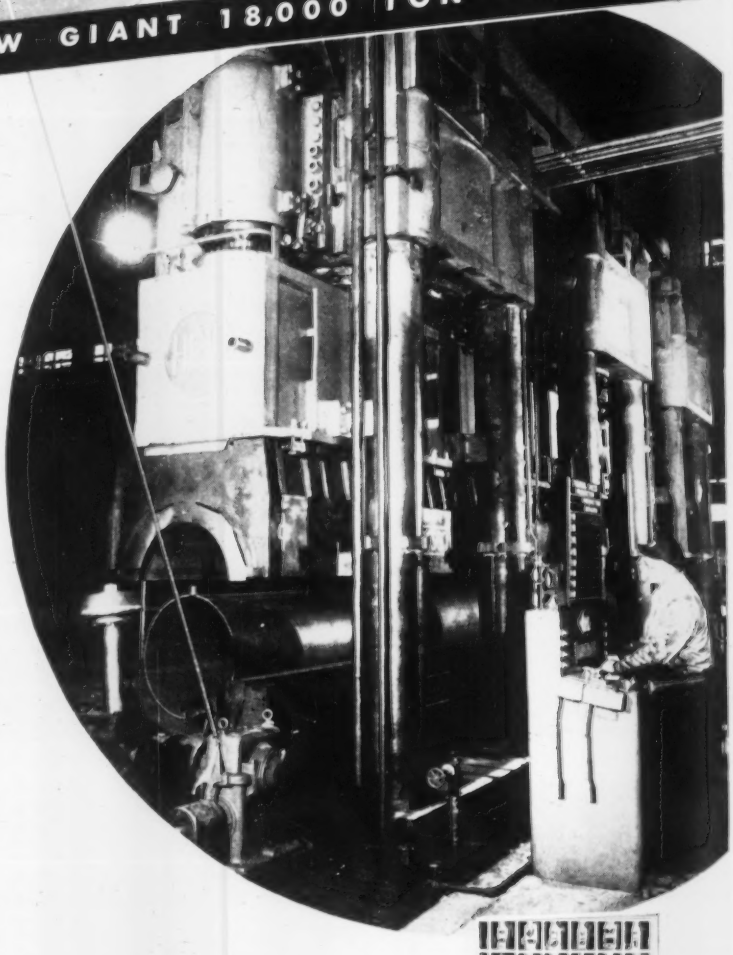
Willis C. Jones, owner of **W. C. Jones Machine Products Co.,** Syracuse, N. Y., for 20 years, died June 2.

Charles J. Knapp, 74, former factory superintendent, **Modern Tool Division,** Consolidated Machine Tool Corp., Rochester, N. Y., died June 1. He held several patents for machine tool processes.

S. George Trull, 73, head of the **Trull Packing Co.,** Buffalo, dealer in mechanical and metal packings, died June 4. He founded the business in 1935.

36" DIAMETER STEEL PIPE *IN A HURRY...*

WITH H-P-M'S NEW GIANT 18,000 TON PRESS!



This giant H-P-M 18,000-ton press takes a 40½ foot long plate of ½ inch steel and forms it into a 36 inch diameter pipe at a production line rate. That's the role selected for two of these huge H-P-M presses now in production at National Tube, McKeesport, Pennsylvania, and Consolidated Western Steel, Orange, Texas.

The hundreds of H-P-M presses now serving the metal working industry have been selected because of their exclusive operational features: FASTRAVERSE hydraulic power system—quick, easy adjustment and control of press speeds, strokes and pressures—features that mean long die life and production with virtually no rejects.

Regardless of the size of your forming, drawing or stamping operations, there's an H-P-M press to improve your production. Call an H-P-M engineer for complete details.

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FASTRAVERSE METAL WORKING PRESSES

SERVING INDUSTRY THROUGH HYDRAULICS

Production and Engineering
NEWS AT A GLANCE

ACCURATE WHEEL FORMS—Form truing grinding wheels used to finish complex contours in hardened steel and cemented carbide split dies, punches, profile gages, flat and circular forming tools, cutters and the like is said to be facilitated by the use of a new attachment which traces from metal templates and will form-true wheels to tenths of a thousandth by means of a truing diamond. It operates on the pantagraph principle, with a reduction ratio of 10 to 1, and will true to a depth of ½-inch on wheels up to 10-inch diameter and 1-inch width. Truing diamond is chisel-shaped and is mounted to rock within a controlled arc about the center of a small radius on its tip so that it always trues the wheel at the proper position as it moves across the face.

HIGH-NICKEL BRAZE—Brazing alloy known as Nicrobaz and containing an appreciable percentage of boron in addition to 65-75 per cent nickel and 13-20 per cent chromium is showing up well in brazing of stainless steels, high-nickel alloys and the "super" alloys used in jet engine and gas turbine construction. It is supplied as a powder, starts to melt at 1850° F and flows readily at 1900° F in a pure dry hydrogen atmosphere.

IMPROVED PLASTIC DIPS—Chemical and paint laboratory technicians at Aberdeen Proving Ground have come up with a new plastic dipping compound for protecting metal parts during shipment and storage in the field, which can be peeled off readily in the same way that similar plastic sealers have been handled. Difference is that the new compound may be dipped at 100° F instead of the conventional 350° F, with ample thickness built up on the part in one dip. Specifications have not yet been released to potential suppliers.

SOAKING UP NOISE—Novel and effective soundproofing element in the Navy's new acoustical laboratory at Annapolis, Md., is an "accordion form" made up of sheets of fiber glass 8 feet wide and of various lengths, wrapped around a collapsible steel framework which when opened resembles a string of V-shaped decorations. The form is claimed superior to the Harvard wedge block plan for trapping noises and makes it possible for instruments to provide studies of sound as low as 60 cycles per second and as high as 8000 cycles. Cost of the soundproofing was only a third of the best previously known method.

MECHANICS OF QUENCHING—Physical phenomena bearing on the oil quenching of steel divide into three phases, each characterized by different rates of cooling. First is relatively slow because of the vapor blanket formed around the heated piece. As the blanket breaks down during the second phase the rate of quench increases and finally levels off as the oil comes into continuous contact. Development of high speed quenching oils has been based upon trying to realize the optimum characteristics for each of these three intervals. Petroleum-base additives have helped to make this possible and also minimize high temperature cracking and oxidation. —p. 72

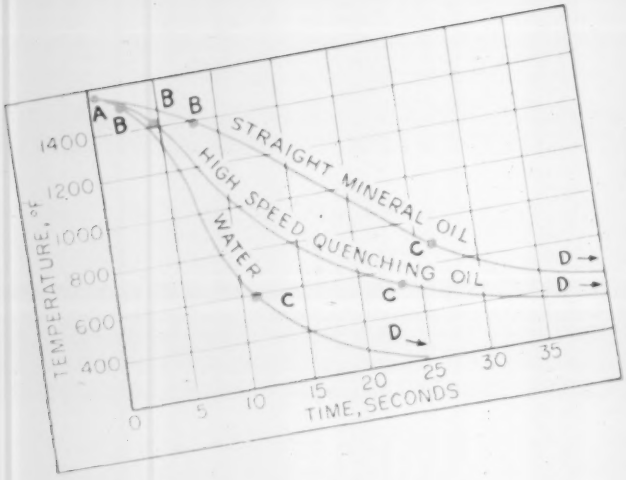
SOUND FIGURING NEEDED—If you are planning the purchase of specialized machinery or equipment, it will be well to have your cost figures based on sound engineering studies, rather than on "guestimates" whipped up by vendors whose figures may reflect only how badly they want your business. Have your machine built up to a planned idea, not built down to a price. A careful and thorough study may even show that purchase of the equipment is unnecessary. —p. 82

ORE FINES ON THE RISE—Screening iron ore into various sizes and then charging only one size in the blast furnace has been proved to increase pig iron production, lower flue dust (used to agglomerate ore fines by sintering) and reduce fuel ratios. With ores being received from new areas, some of which resort to crushing before shipment, the trend line on percentage of fines is rising, so their consolidation by sintering becomes more necessary. —p. 86

FLEXIBLE LOAD SUPPORTS—Static test lab of a West Coast aircraft manufacturer presents some novel construction features. The floor has lengthwise and crosswise trenches 5 feet deep filled with reinforced concrete and supporting flush 10-inch I-beams, anchored in the concrete. Six 24-inch I-beams with 90-foot span are positioned over the floor beams and are supported by 15-inch columns 30 feet long, the latter being movable when overhead beam loading requires closely coupled support. —p. 75

POT SHOTS: Construction progress at one large new manufacturing plant in the automotive industry was shoved back a step recently when the Atomic Energy Commission put the finger on a consignment of steel office partitions for the plant . . . Manufacturer of magnetic separators found a gauss meter solved the problem of conveniently and quickly measuring the strength of horseshoe magnets . . . Hollow steel "Zep-props", capable of being quickly feathered from forward, through neutral and to reverse positions by means of an electric transmission are used on the ZPN, world's largest blimp packing 875,000 cu ft of helium, now being readied for flight tests at Akron. —A.H.A.

Metalworking Outlook—p. 35 Market Outlook—p. 149



Time-temperature curves, SAE 1095 steel. Physical phenomenon of a mineral oil quenching a piece of carbon steel takes place in three distinct phases, represented here by A to B, B to C and C to D

High Speed Quenching

By W. J. REITZE
Staff Engineer
Esso Standard Oil Co.
New York

MECHANISM of hardening steel by controlled cooling has been under investigation for many years and changes in the structures of carbon and alloy steels are well known so that practical heat treating is now based on sound theoretical principles. The desired structures, hardnesses and other physical properties of steel are obtained by employing various cooling mediums to control the rate of cooling of the metal within desired limits.

Many liquid cooling mediums are used: Mercury, metallic salt brines, water and animal and mineral oils with the choice of these mediums depending upon their rates of heat transfer, chemical stability, availability and cost.

Selection of the quenching medium must take into account the composition and structure of the steel, hardening characteristics as shown by "S-curves," which are isothermal transformation diagrams showing the time required at any temperature (below the range of stability) for austenite to begin and finish forming. The geometric contours of the part being quenched and its thickness must also be considered when selecting a quenching medium. If a part to be hardened is too drastically quenched (cooled too rapidly) then cracking or distortion of the part may result. The rate of cooling however must be sufficiently rapid to prevent transformation of the steel structure with a resulting reduction in hardness.

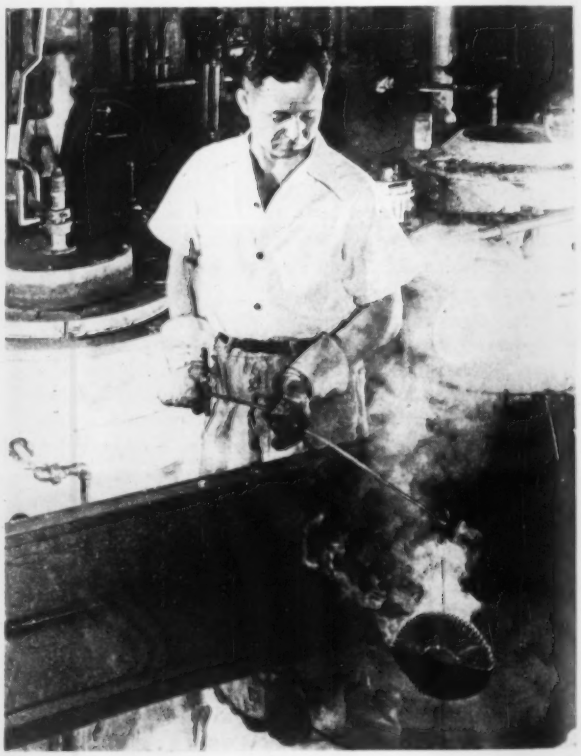
Heat Removed During Quenching—The role of any quenching medium is to cool the steel at a controlled rate depending upon the type of steel to be quenched and the characteristics desired in the finished part.

The physical phenomenon of a mineral oil quenching a piece of carbon steel takes place in three distinct phases. Each of these phases produces a different rate of cooling. With the part heated above its critical temperature the part is promptly immersed in the quenching oil which cools it at a relatively slow rate. This is a common phenomenon in quenching and is caused by the formation of a vapor blanket, a gaseous envelope that forms around the hot steel when it comes in contact with the cool oil. Until it is dissipated the vapor blanket completely surrounds the steel insulating it from the quenching fluid and thus prevents a rapid flow of heat from the metal to the fluid. This phase corresponds to points A to B for the three quenching mediums shown on the time-temperature curves.

Vapor Blanket Unstable—As the steel is further cooled it enters the second stage of cooling which is somewhat faster than the first stage. By this time the vapor blanket has become very unstable, with globules of the quenching oil passing through the blanket and coming into direct contact with the steel. This phase continues with violent boiling of the quenching oil as it comes in contact with the steel. It continues until the vapor envelope finally collapses completely. This phase, with its increase in cooling rate is indicated on the three curves, points B to C.

Final stage of quenching is reached when the steel has cooled sufficiently so the quenching oil is in continuous contact with the surface of the part and the cooling effect is obtained by normal convection. The

Gear being removed from a quenching tank



Oils Increase Surface Hardness

Quenching efficiencies of these oils impart additional hardness to steels, especially to low carbon steels, permitting their use in many places formerly requiring alloy grades

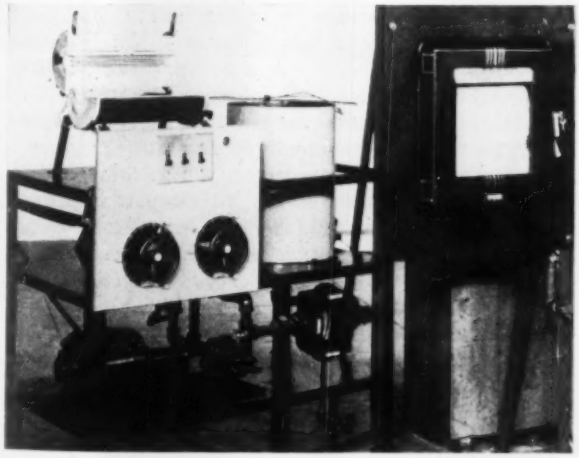
temperature of steel has now approached that of the quenching oil and at this point the quenching operation is completed. This characteristic is shown at points C and D for the three quenching mediums.

Quenching Mediums—All quenching operations will include the three stages discussed above. However, the intensity and duration of the changes, that is the rate of cooling the metal part, will depend upon the type of quenching medium used. The relative cooling rates of different types of quenching oils and water are illustrated in the temperature curve for an SAE 1095 steel, ½-inch in diameter, 2 inches long, with no directed flow of the quenching medium.

From an examination of the curve it is apparent that the heat transfer rate in any of the three phases mentioned previously is more rapid when water is used as the quenching medium. However, in this case and in most operations where steel is cooled without interruption from initial high temperature the cooling rate provided by water is so fast that it causes distortion, cracking and severe straining of the steel during the final stage of the quenching operation.

Not all mineral oils are equally effective as quenching mediums for steel, and it is difficult to evaluate one oil in relation to another in terms of the available physical inspections on the oils. Considerable experimentation is usually required before the complete behavior of a single oil quenching medium can be understood.

Test setup for high speed quenching oils. Shown here are an electric heating unit and bath, oil pump, temperature controls and special high speed temperature recorders



Theoretically the most desirable quenching medium should have:

1. Characteristics of water during the first or vapor blanket stage.
2. Characteristics intermediate between water and oil during the second stage.
3. Characteristics of straight mineral oil in the third stage.

The development of high speed type quenching oils has provided the heat treater with a quenching medium which most closely approximates the ideal quenching medium. The advent of new type petroleum derivative additives has made it possible to provide superior quenching oils. In addition to being faster these newer quenching oils are not subject to the high temperature "cracking" and oxidation that occurs with animal and vegetable and fish oils which formerly were the compounding agents in mineral oils.

High Speed Quenching Oil Characteristics—Characteristics of a high speed quenching oil are similar to those required of straight mineral oils plus some additional features which would include the following: Chemical and oxidation stability: The quenching oil should maintain its characteristics over long periods of time without chemical deterioration, thickening or becoming rancid. The oil should resist any deteriorating effect caused by contamination with dust, dirt, and scale. The high speed quenching oils should be compatible with other types of mineral oils used as quenching mediums.

High boiling point: High boiling point fractions are desired since vaporization loss is increased in proportion to the amount of low-boiling constituents in the oil. Usually, excessive vaporization results in a gradual thickening of the oil and may result in non-uniform hardening by preventing oil globules from breaking through the vapor blanket and reaching the piece being quenched.

Proper viscosity: Viscosity should be low—in the range of 75-125 Saybolt seconds at 100 F. Higher viscosity oils tend to reduce the cooling rate characteristics and also increase the loss by adherence of the high viscosity oil "drag-out" to the parts which are being removed from the quenching batch.

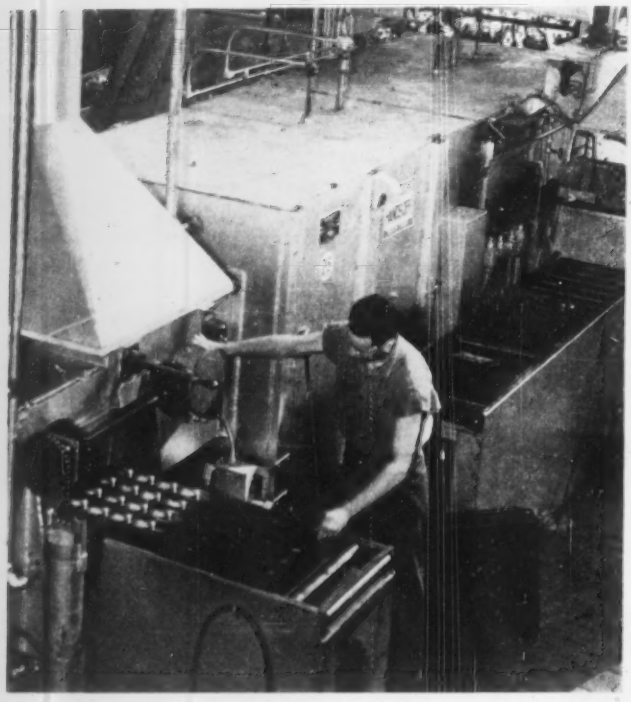
High flash and fire points: High speed quenching oils, like other types of quenching oils, will ignite on continuous application of heat to the surface. However, in practice, the steel—at a temperature of about 1500 F—is immersed rapidly so the surface layer of oil in contact with the oxygen in the air is not heated to the ignition temperature. The flash and fire points

of the quenching oil should be sufficiently high to reduce this fire hazard. To insure adequate safety against fire the flash points of quenching oils should be 345 F. minimum.

Water Cuts Cooling Rate—Small percentages of water in a high speed quenching oil will considerably reduce its fast cooling rate. Water content as low as 0.5 per cent will seriously reduce the cooling rate from its original speed.

A high speed quenching oil should last for long periods without any serious changes in its composition that might make replacement necessary. Vaporization losses and drag-out losses should be low so as to minimize the amount of make-up quenching oil required. Usually a quenching oil will remain in service for long periods of time.

Quenching Oil Test—To determine speed characteristics of a quenching oil the 5-second quench test



Automatic hardening equipment in which racked workpieces travel by conveyor through a furnace and then to the quenching bath. Courtesy Westinghouse Electric Corp.

is generally used. This procedure determines the percentage of the total heat content of a hot steel test specimen removed during a 5-second quench in the test oil. A typical laboratory quenching oil test setup, shown in one of the illustrations includes an electric heating unit and bath together with oil pump, temperature controls, and special high speed temperature recorders. Evaluation of high speed quenching oils when compared with other types of oils can also be carried out with the standard hardness tests such as Jominy-end cool tests for medium-hardening steels, ASTM method A255-46T, Rockwell-inch tests for shallow-hardening steels, and the Cone test by Greene and Post. These tests using water as the quenching medium for a reference base should then be modified to use the test oils instead of water as the quenching medium.

TABLE I
COOLING RATE
WATER, HIGH SPEED QUENCHING OILS AND STRAIGHT MINERAL OILS
SAE 1095 STEEL

	A-B Phase	B-C Phase
Water	50°F per second	100°F per second
High speed quenching oil	40°F per second	68°F per second
Straight 100 vis. mineral oil	28.8°F per second	33.8°F per second

TABLE II
TYPICAL PHYSICAL CHARACTERISTICS OF A HIGH SPEED QUENCHING OIL

Specific gravity at 60° F	0.88
Viscosity, SSU at 100° F	85
Pour point, °F	+27
Flash point, open cup, °F	347
Fire point, open cup, °F	380

TABLE III
EFFECT OF CIRCULATION
SAE 1095 STEEL, 100 VISCOSITY STRAIGHT MINERAL OIL AT 100° F

	Phase A-B	Phase B-C
Still oil	10°F per second	21.8°F per second
10 GPM	12.5°F per second	31.4°F per second

Typical 5-Second Quench Oil Test
SAE 1095 Steel—Oil Viscosity—85 SSU at 100° F

Test Oil	% Quench in 5-Second Test
Straight mineral oil	17
High speed-type quenching oil	42

Advantages of High Speed Quenching Oil—Under similar quenching operation sequences the high speed quenching oil will generally give up to about 20 per cent increase in Rockwell hardness numbers depending on the material being quenched. For example an SAE 1095 test specimen quenched with a high speed quenching oil will show an average surface increase in Rockwell hardness numbers of approximately 5 over that when using a straight mineral oil. It is evident from the time-temperature curves illustrated that with the advantage of higher speed quenching there is a minimum of distortion and cracking of the parts. The overall high speed quenching efficiencies of these oils impart additional hardness to steel, especially the low carbon steels, and will permit their use in places where it had been necessary to use alloy steels.

Hot vs Cold Oil Quench—The question of hot oil quench and cold oil quench indicates the hot oil quench to be somewhat more preferable. Test data indicate the vapor film stage points B-C of the time-temperature curves illustrated to be somewhat faster with the hot oil quench than with the cold oil quench. Viscosity of the quenching oil being less at the higher temperature permits a much faster cooling rate by permitting the vapor blanket to collapse quicker. Normally, a quenching oil bath of approximately 120°F is considered good practice as temperatures higher than this will increase the fire hazard.

An increase in the speed of any quenching oil can be accomplished by increasing the circulation around the piece being quenched. This of course may be accomplished by having a high circulation rate within the quenching tank, by placing the piece to be quenched near the inlet to the quenching tank, providing auxiliary stirrers within the quenching tank, or by manually moving the piece through the quenching oil. The effect of circulation of a quenching oil is shown in Table III, with the phase references similar to those shown in the diagram.

"Erector Set" Construction Used in Test Laboratory

Slit trench layout prior to pouring the laboratory floor. Each trench is 2 feet wide and 5 feet deep

By GILBERT C. CLOSE

DESIGNERS of the new engineering static test laboratory at the El Segundo, Calif., plant of Douglas Aircraft Co. followed the principle used in the manufacture of toy steel erector sets to provide a convenient method for transmitting large test loads directly to the building structure itself. While sidewalls and roof of the building are of conventional structural steel design, the load-bearing floor and inner load transmitting structure is unique.

Static stresses used in testing modern high-speed military and transport airplanes and components may aggregate in the millions of pounds, with dynamic and impact loads even higher. Facilities for transmitting a portion of these loads to the building structure itself speeds the work, and detracts from the size and cost of heavy duty testing equipment.

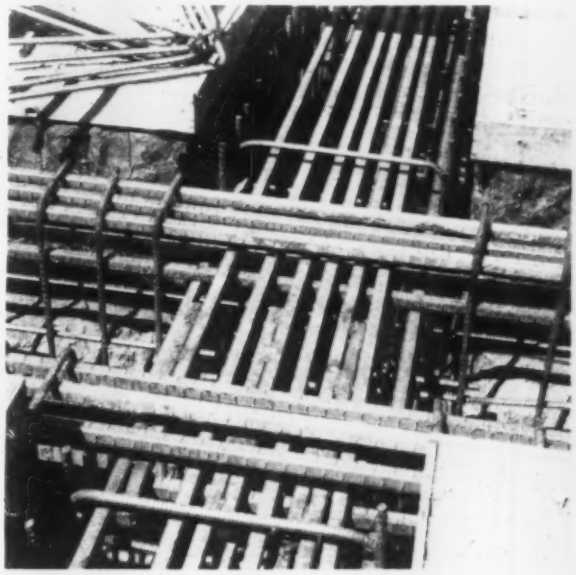
The 100 x 120-foot floor area is stressed steel reinforced concrete varying from 6 to 10 inches thick on the apron, and anchored in seven slit trenches about 2 feet wide and 5 feet deep, four lengthwise and three crosswise of the building area. Before pouring the concrete, a 10-inch I-beam was set directly over each slit trench with its upper flange at floor level and anchored downward by numerous reinforcing rods bolted through the lower flange. Forms were installed to prevent the concrete from slushing against the I-beam's upper flange, and to provide working space.

To provide additional strength, the floor was laid by continuous pouring of concrete.

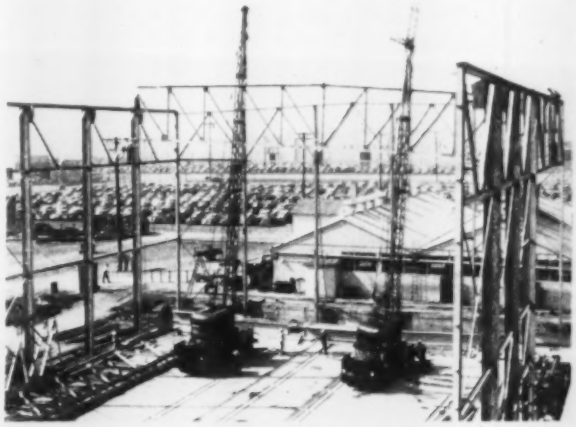
The inner structure which transmits heavy test loads to the floor is composed of six 24-inch I-beams, each with a 90-foot span. Four of these beams are placed directly above the four lengthwise slit trenches; the other two are spaced on centers over the three crosswise trenches. These beams are supported by 15-inch columns, 30 feet long, which are unattached and movable. Thus when the overhead beam loading is so great that closely coupled support is required, the upright columns may be moved inward to the desired location.

The "erector set" principle was accomplished by template-drilling in the anchored floor beams, overhead beams, and columns, numerous holes all spaced 6 inches on center. With the aid of standard offset and attachment angles, also with holes drilled on 6-inch centers, the movable upright columns can be spaced for greatest load bearing without additional work or drilling. The template-drilled holes also provide a means of anchoring standard stress take-off attachments to any place on the beams or uprights.

Below—Detail of stressed reinforcing steel at slit trench junctures. This serves as a juncture for floor-anchored I-beams used to absorb stress loads



Portable cranes hoisting roof trusses into place. Note clearance around and under upper flange on floor beams to provide working space for drilling holes and making connections for load transmission



Duplex Setup Solders Type to Typewriter Bars

Arrangement with double flame for heating guarantees precise fastening of type characters to each of 42 bars. Alignment after soldering is checked by comparator

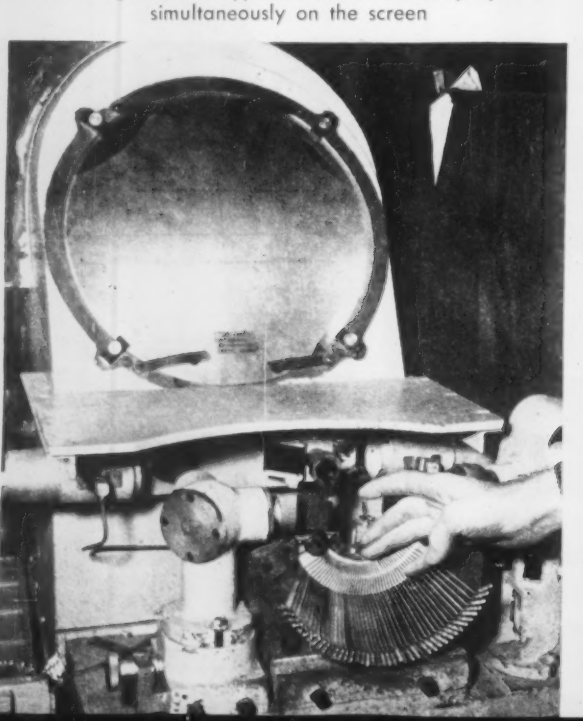
By HERBERT CHASE

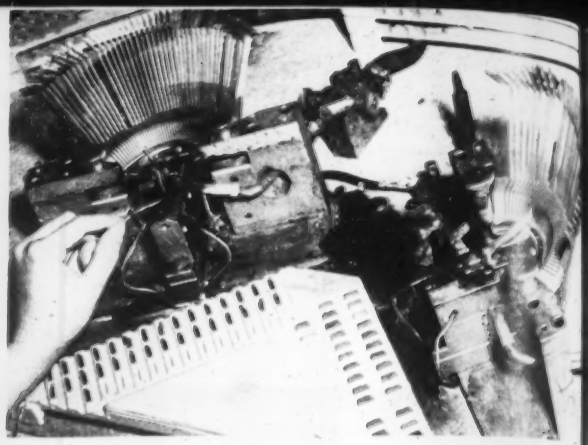
COPY produced on IBM electric typewriters is characterized by alignment equaling that of well printed pages. To accomplish this result, the type itself must be precisely located on each of the 42 type bars. In the new model of this machine, built by International Business Machines Corp. in its greatly expanded Poughkeepsie, N. Y., plant, type is soldered to bars in duplex setups.

Bars are already assembled in groups of 42 when the type, taken in proper sequence from trays, is applied to one bar at a time. Each piece of type containing two characters is slotted on the back to fit over the end of the bar and is held in place by solder. The latter is used partly because it permits changing of type bars in the field if special requirements or damage in service necessitate this.

Type Carefully Aligned—A duplex arrangement involving two sets of bars is used because, by working on each set alternately, a bar just soldered is sure to cool adequately before the next bar is shifted to working position. This avoids the chance that a worker will move a bar just soldered before the solder has frozen completely and may inadvertently cause the type to shift by so doing.

Checking for precise alignment of type after soldering is done in this setup on a comparator in which two images of the type on each bar are projected simultaneously on the screen





Duplex setup for gas soldering type to stamped type bars. The two fixtures are used alternately

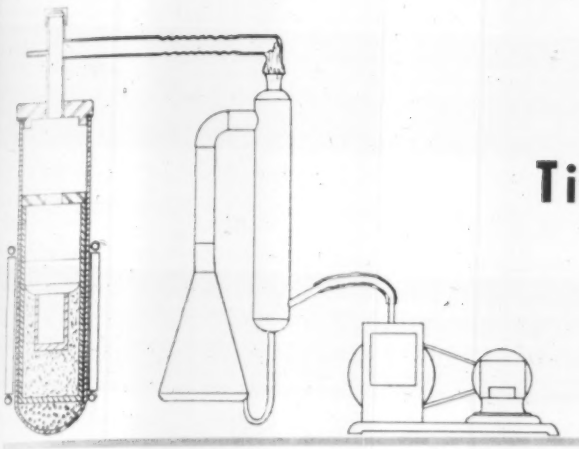
Each bar of the set is moved in succession to soldering position and is locked there while flux is applied with a small brush. Then the type is put in place and moved against a stop. Next, a pedal is pressed turning on two gas flames that apply heat rapidly to each side of the bar just below the type. Only a few seconds are required for the correct soldering temperature to be reached. When it is attained, the flames are shut off, the operator quickly applies solder in the form of a wire from a reel and the solder flows instantly into the joint. While this bar cools, the operator repeats the same sequence of events on a bar of the other set.

Although fixtures insure good location, the bars themselves as well as the type and its location may vary more than is permitted, hence the assemblies go to aligning stations in which operators skilled in adjustment bend or twist the individual bars slightly, if necessary, and make other minor adjustment to bring each character to position considered correct.

Comparator Checks Position—Final check on type position is made, however, by use of a special two-beam J & L comparator, in which two images of the type are projected in greatly enlarged size on the screen. One beam is directed normal to the face of the character to produce an image of the face. A template on the face shows whether the two characters have their center lines correctly located vertically and horizontally and whether the lines are in or at an angle to their proper position. If deviations are beyond the limits, a correction has to be made.

Profile of the type must also be checked to see that it is within limits on the part of the screen where the profile image is thrown. This image results from a beam thrown across the face (parallel rather than normal thereto) and directed by prisms to the screen. Deviations beyond the limits marked have to be corrected by adjustment until the image is within limits.

As the type on each of 42 bars has to be checked in succession, templates for each must be provided. Once the assembly passes this inspection, it is deemed correct and is ready for transfer to final assembly. There, actual writing and other tests are applied but the projection test is the best means of checking type bar subassemblies yet devised.



Vacuum Melting Titanium and Zirconium

Research on production of titanium and zirconium ingots is concentrating on the use of a graphite crucible under vacuum or inert atmosphere, heated in a high frequency induction furnace

Laboratory vacuum induction furnace for melting titanium and zirconium

PRACTICAL methods of melting titanium and zirconium on a plant scale are currently receiving considerable attention as applications for these two metals expand. At a symposium sponsored by the Niagara Falls section of the Electrochemical Society, A. C. Haskell Jr., Titanium Alloy Manufacturing Division, National Lead Co., described techniques used by his company to melt the metals on a production basis.

Haskell pointed out that the number of methods being successfully used to melt titanium and zirconium have been limited by the metals' extremely high affinities for all atmospheres at elevated temperatures except the noble gases. In addition, both metals will react rapidly with nearly all refractories. Research and development at the Titanium Alloy Manufacturing Division on production of titanium and zirconium ingots has been directed toward the use of a graphite crucible, under vacuum or inert atmosphere, heated in a high frequency induction furnace.

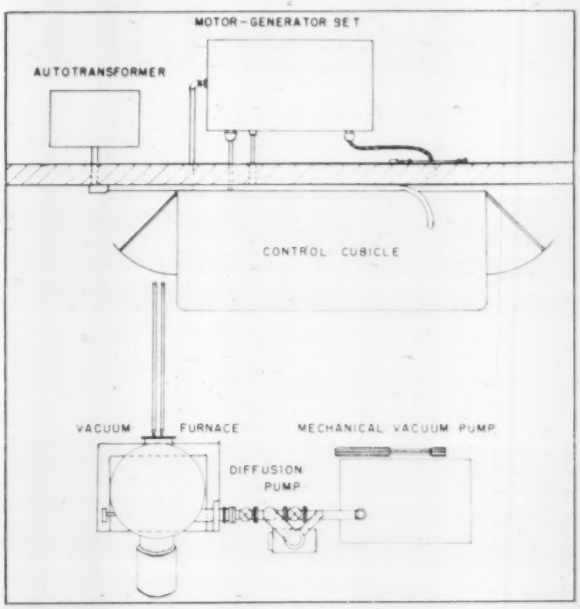
25-Pound Ingots—Titanium is melted in graphite in a tilting type furnace producing ingots up to approximately 25 pounds with carbon contamination ranging from 0.27 to 0.72 per cent. Zirconium is melted in graphite in a bottom-pour type furnace producing ingots up to nearly 40 pounds with carbon contamination ranging from 0.17 to 0.24 per cent and Brinell hardness ranging from 170 to 229.

Three types or modifications of induction furnaces were employed. The laboratory unit was merely a 5½-inch diameter 25-inch long quartz tube, inserted in a high frequency coil. Bottom of the tube was closed and the top covered by a water-cooled, gasketed head containing a quartz sight port and vacuum connections. Low absolute pressure was attained through the use of a three-stage mercury diffusion pump backed up by a small mechanical vacuum pump, the pressures being measured by a tilting type McLeod gage. The graphite test crucible was supported by lampblack within a 5-inch zircon crucible which fitted snugly in the quartz tube.

In contrast to the laboratory furnace, the larger unit has its high frequency coil within the vacuum chamber and employs a tilting arrangement to permit casting of the metal into an ingot mold. Rated output of the generator is 100 kw with a frequency of 3000 cycles per second.

Small Melting Plant—This small melting plant consists of six major pieces of equipment. These units—starting at the 220-v, 60 cycle, 3-phase power source—are the auto transformer to supply 440-v power for the motor-generator set, control cubicle, furnace, oil diffusion booster pump and 100 cfm mechanical vacuum pump. With the exception of the furnace, these various items of the equipment are all more or less standard.

Vertical walls of the shell are nonmagnetic stainless steel. The high frequency coil is located symmetrically with the axis of the shell, and is lined with mica to retain the lampblack insulation around the graphite crucible. The pouring spout is merely an extension of the crucible wall. The crucible is covered by a slab of graphite which can be manipulated from the outside. The cast steel (or cast iron) ingot



Layout of melting plant for titanium and zirconium

mold is usually held in position in the side arms by two special steel fixtures.

Redesigned for Bottom Pouring—The tilting type furnace, just described, was redesigned to allow bottom pouring down into a vertically aligned ingot mold rather than pouring over the lip of the crucible. The conversion was rather simple. A 6-inch standard steel pipe was welded to the bottom of the furnace to contain the ingot mold. This pipe was closed at the bottom and could be separated from the furnace at the flange. The supporting refractory and pack for the crucible were revised so a graphite tube could be inserted, which would serve as a guide for the stream of molten metal. A 1-inch graphite stopper rod was actuated through the cover by the poke rod working through a modified Wilson seal. The two rods were connected by a reducing coupling, which had to be made up each time the cover was closed.

A cylindrical getter tray, with the proper openings for the stopper rod and sighting was placed in the top of the crucible. Fairly fine pieces of zirconium sponge were contained in the tray, which when heated to dull redness, acted as a very efficient getter for oxygen, nitrogen, or water vapor.

Graphite was chosen as the first refractory material to be tested since it contained no oxides with which the titanium could react.

Three Separate Operations—The basic procedure is similar for all three types of furnaces and consists of the following separate operations: (1) Crucible packing, (2) degassing and (3) melting. Although the packing of the crucible is a manual operation, it is critical in that the crucible must be properly located with respect to the coil, and the lampblack insulation contained within the mica retaining ring must be carefully packed to provide the required thermal and electrical insulation.

TABLE I
EFFECT OF TIME ON CARBON CONTAMINATION OF TITANIUM

Time Molten	% Total Carbon (Ave.)	Max. Temp. During Melt	Vacuum During Melt
2 min	0.52%	2900° F	2-4 microns
10 min	0.54	.....	3-4 microns
30 min	1.11	2940° F	3-4 microns

Degassing is accomplished by heating the crucible to approximately 3100°F under a vacuum of 1000 microns or less, and maintaining these conditions for 15 to 30 minutes. Following the degassing period the furnace is cooled to at least below a dull red heat under vacuum.

Melting Simple with Quartz Tube—According to Haskell, with the quartz tube type furnace, melting was rather simple; the titanium powder or shot was usually poured into the crucible through a long, large diameter glass tube, and the covers put in place. The water-cooled head and gasket were set on the quartz tube and the head was attached to the vacuum pumping system for slow evacuation to 5 microns or less. The heat was applied gradually to the crucible and charge by means of the 30 kva spark gap converter. The melt was allowed to solidify in the crucible and was cooled under vacuum.

TABLE II
EFFECT OF PRESSURE ON CARBON CONTAMINATION OF TITANIUM

Absolute Pressure During Melt	% Total Carbon (Ave.)	Temp. During Melt	Time Molten
2-3 microns	1.24	2830° F	10 min
100 microns	1.41	2920° F	10 min
500 microns	1.61	2950° F	10 min

The procedure for producing a melt on the large tilting type furnace is basically the same as that just described.

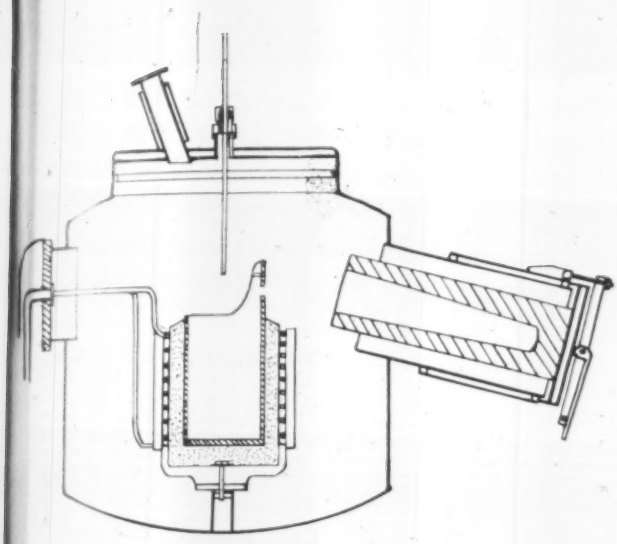
The procedure for the third modification or bottom pour induction furnace was quite similar to the tilting type. Haskell emphasized that the technique of casting with this furnace is much simpler. Instead of rotating the furnace approximately 100 degrees, the stopper rod was merely lifted about 2 inches and after the metal had poured out, the unit was shut down. To hasten cooling, argon could be added and the furnace opened when at dull red heat.

Haskell mentioned that the technique of pouring in the tilting type furnace was made somewhat difficult by skulling either in the pouring spout or the ingot mold. This was overcome by extending up the lip of the crucible and cutting a special shaped hole in it which guided the stream of molten metal into the center of the ingot mold. The metal was prevented from overflowing the lip by a small graphite dam. The maximum size titanium ingot poured was approximately 25 pounds. The limitations on the size was governed by the amount of low bulk density titanium sponge which could be held by the crucible.

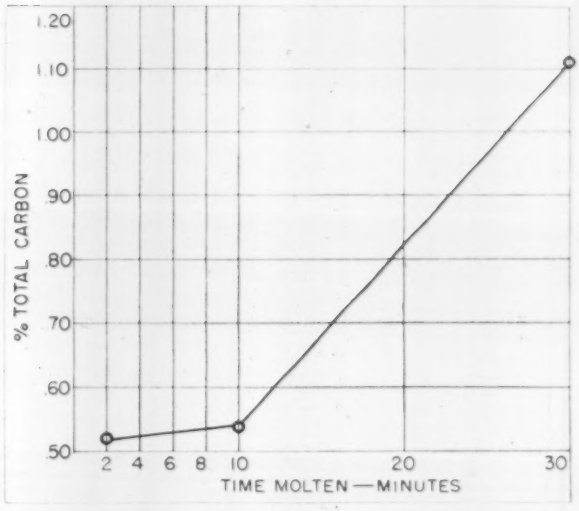
Zirconium Bottom Poured—Development work on the bottom-pour furnace has been concerned entirely with the production of zirconium ingots. Since the true density of zirconium is 6.4 as compared to 4.5 for titanium, and a hydraulic press was used for briquetting the zirconium sponge, heavier charges could be made to the crucible. The ingots produced have varied from 33.6 to 39.8 pounds and recoveries have varied from 91.0 to 98.0 per cent with an average recovery of 96.1 per cent. Briquetting titanium sponge would aid considerably in making larger ingots.

Since the ingots are to be put into various shapes from sheets to wire, they must be as soft as possible. Hardness of the ingot can be relied upon as the most important criterion of quality. It was found by experience that the recovery over the forging and rolling operations dropped sharply when using ingots which were harder than 220 Brinell. Hardness of the ingots produced varied between 170 to 229.

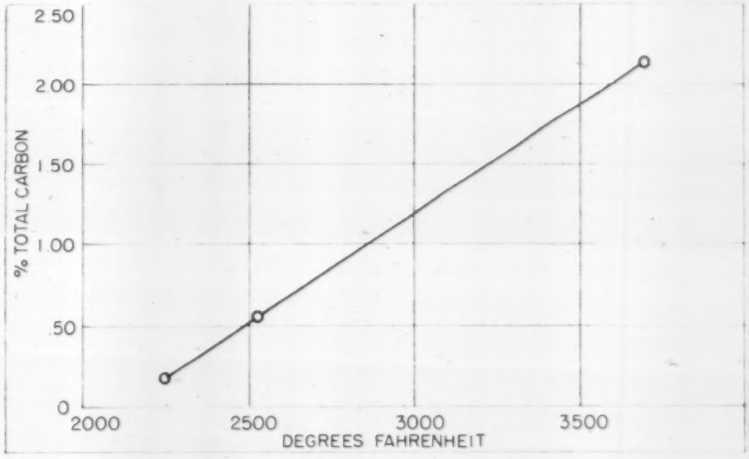
Carbon Contamination—Prior to determining the effect of pressure on carbon pick-up, it was necessary to conduct tests to determine conditions of time and temperature for minimum contamination. Carbon content of two titanium ingots from the tilting furnace was found to range from 0.27 to 0.72 per cent. Carbon contamination of zirconium is not as serious as with titanium since the solubility of carbon in zirconium is lower. Two zirconium ingots which were analyzed for total carbon showed 0.17 and 0.24 per cent.



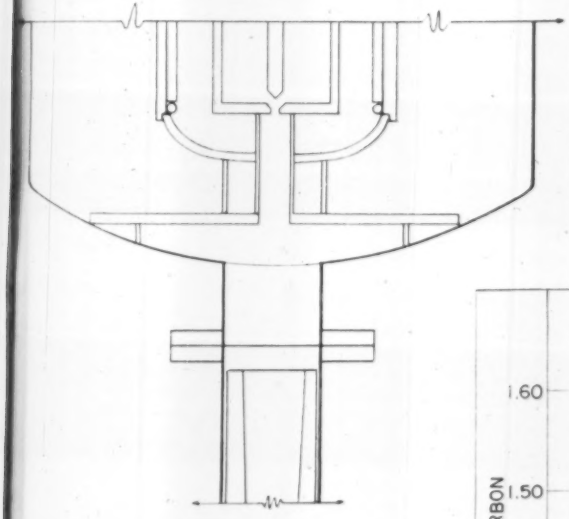
100 kw vacuum induction furnace used in melting titanium and zirconium. The diagram shows the shell with its loading hatches and the seals through which water-cooled high frequency leads enter the furnace



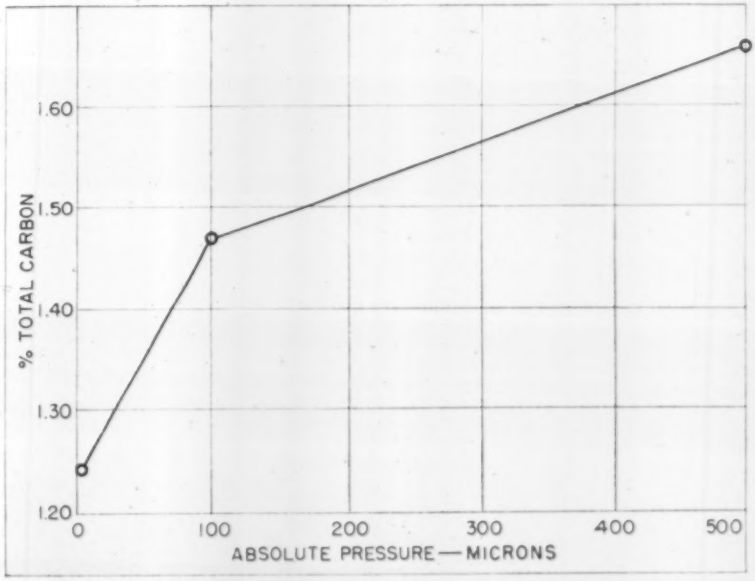
Effect of time on carbon contamination of titanium



Effect of temperature on carbon contamination of titanium



Tilting type furnace was redesigned, as shown here, to allow bottom pouring down into a vertically aligned ingot mold rather than pouring over lip of crucible



Effect of pressure on carbon contamination of titanium

New Device Increases Hammer's Operational Flexibility

"NOW the drop-forge hammerman can literally make the hammer talk", was the comment of a forge shop operator after witnessing a demonstration of the new short stroke control recently developed for the Chambersburg Ceco-Drop. The control is an air-operated mechanism which enables the operator of this gravity-drop hammer to select either a long or short stroke of the ram at will. It increases the hammer's operational flexibility by making it possible to strike a series of short blows for rolling, drawing, fullering or edging; and then without interruption to strike a series of long blows for forging in the breakdown, rough or finish impression of the forging die.

Fig. 1 shows a short stroke control installed on the hammer. A small pushbutton conveniently mounted in the treadle controls the selection of blow. The mechanism can be arranged for either a normal long stroke with a short blow at the operator's option; or a normal short stroke with a long blow at the operator's option. When not in use, it can be easily removed from the hammer and re-installed when needed again.

The principles underlying the short stroke control are simple but not conveniently applicable to the board drop hammer.

A typical installation on a 2500-pound unit at Cornell Forge Co., Chicago, provides an illustration of an instance where flexibility of the short stroke control is used to increase productivity in the forging of steel ankle joints for leg braces.

Fig. 2 shows the forging as it appears during various stages of the forging operation. The process begins by a series of 20 to 23 short, rapid blows (about 18-inch stroke) to draw the 23/32-inch diameter round stock. This is followed by two long blows (about 35-inch stroke) to roll it; three more long blows in the rough impression; and three more long blows in the finish impression to complete the job. After the last blow the ram is stopped on the up-stroke at the "short-blow" position ready to commence the next forging.

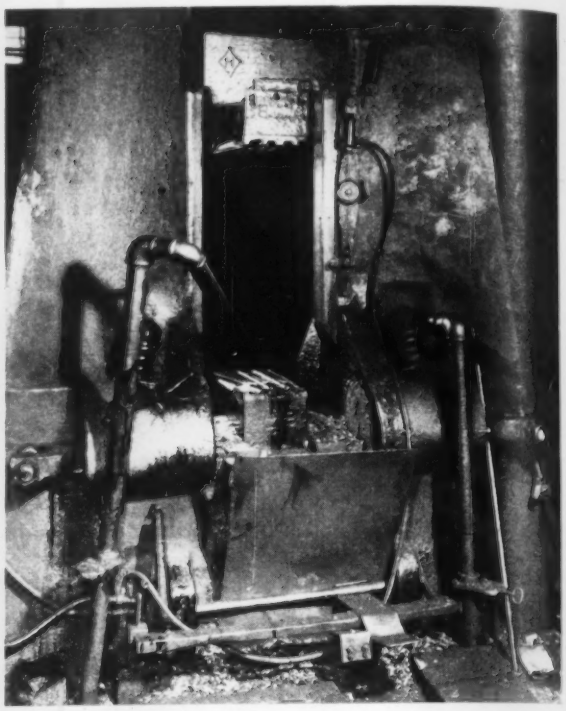


Fig. 1—Short stroke control as mounted on a 2500-pound Ceco-Drop hammer set up to forge steel ankle joints for leg braces

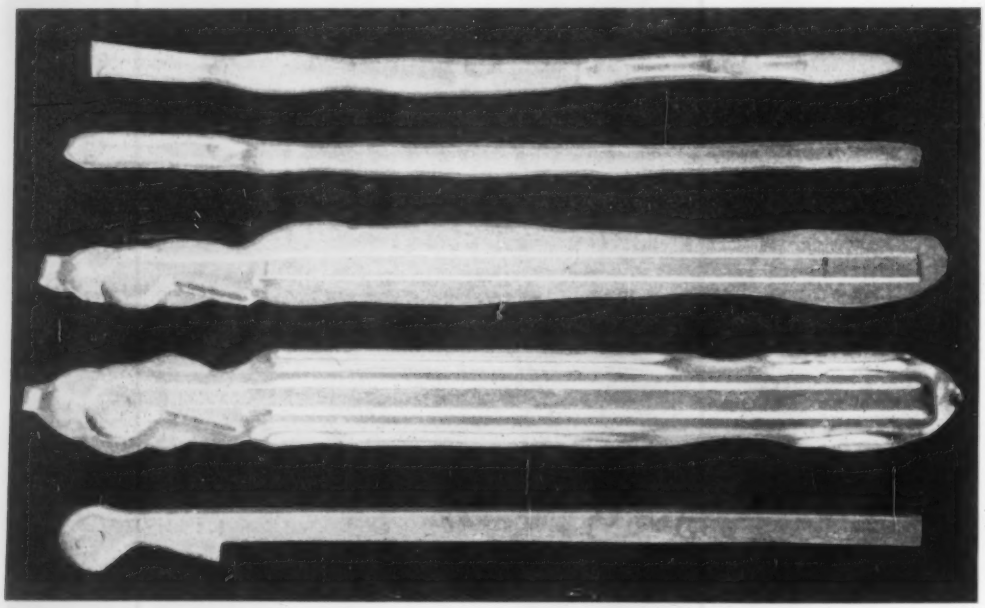


Fig. 2 — Ankle joint forging for leg braces as it appears during the various stages of the forging operation

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How to Estimate

SPECIAL MACHINE COSTS

By CHARLES P. EISENHAUER
President
Universal Tool Co
Dayton, O.

SPECIAL machines are often necessary in precision manufacture, either to provide savings in quantity production, or to make specially designed pieces not suitable for accurate production on standard equipment. In either case, before a manufacturer can make a sound decision on whether such a machine is necessary, accurate cost figures are needed. Such figures—if they are realistic—can help him assess the cost of the machine against projected savings, or help him set a fair price for a manufactured item that demands special equipment for its production.

Too Much Rule of Thumb—As a result, tool manufacturers who specialize in making such machines are often called upon to give a quick estimate of cost. This estimate is sometimes expected from a hand-made sample, or from a drawing of the part to be made. Such toolmaking companies are generally selected because they are technically capable of designing and producing unusual machinery. But many times, although they have the technical and manufacturing facilities to do a good special-machine development job, they use rule-of-thumb methods in estimating costs for the customer.

To arrive at a cost estimate of practical use on a machine that might cost, say, $25,000, considerable time has to be spent in making layout drawings and engineering estimates. This work helps the toolmaker decide on the best means to get the results desired most economically, and to figure the cost of the special equipment.

The individual tool manufacturer, on the other hand, cannot today spend the time necessary to get the best design that will produce the part most economically, have a simple practical construction, and be least costly to make, unless some equitable arrangement for remuneration is provided.

Guessing Game—As a result, the purchaser calls in several tool manufacturers who are willing virtually to guess at what the designing and building cost might be, based on some of their past experiences, and who are willing to quote a price on this basis. A guessed amount, depending greatly on their need for work, is added to care for unforeseen eventualities.

Any tool manufacturer who obtains a job to design and build on the above guess quote basis starts out to meet price. The time he allows for careful analyzing and development of various ideas, is necessarily limited. His criterion is to keep the cost of special-machine manufacture down, so the price can be met. This often results in partially defeating the reason for the special equipment, namely to produce quality parts in the least time.

The buyer under this arrangement, it is true, knows he has a definite price. But the most efficient design is not necessarily obtained. Sometimes disagreements arise as to what the customer was to get in the design, since nothing specific existed at the time the quoting was done. The motto, "you get what you pay for" works here too.

It is much more desirable to have a machine built up to a planned idea, than it is to have a machine built "down" to a price.

Cut Losses, Charges — The following procedure, based on long experience, gives the best and most economical results for all concerned.

The buyer selects a capable, dependable manufacturer to do the work. An hourly rate is agreed upon. The hourly rate, while a factor in the final cost, is not the most important. Quality, simplicity of design, low fabrication cost and the least hours in designing, are most important toward the final cost.

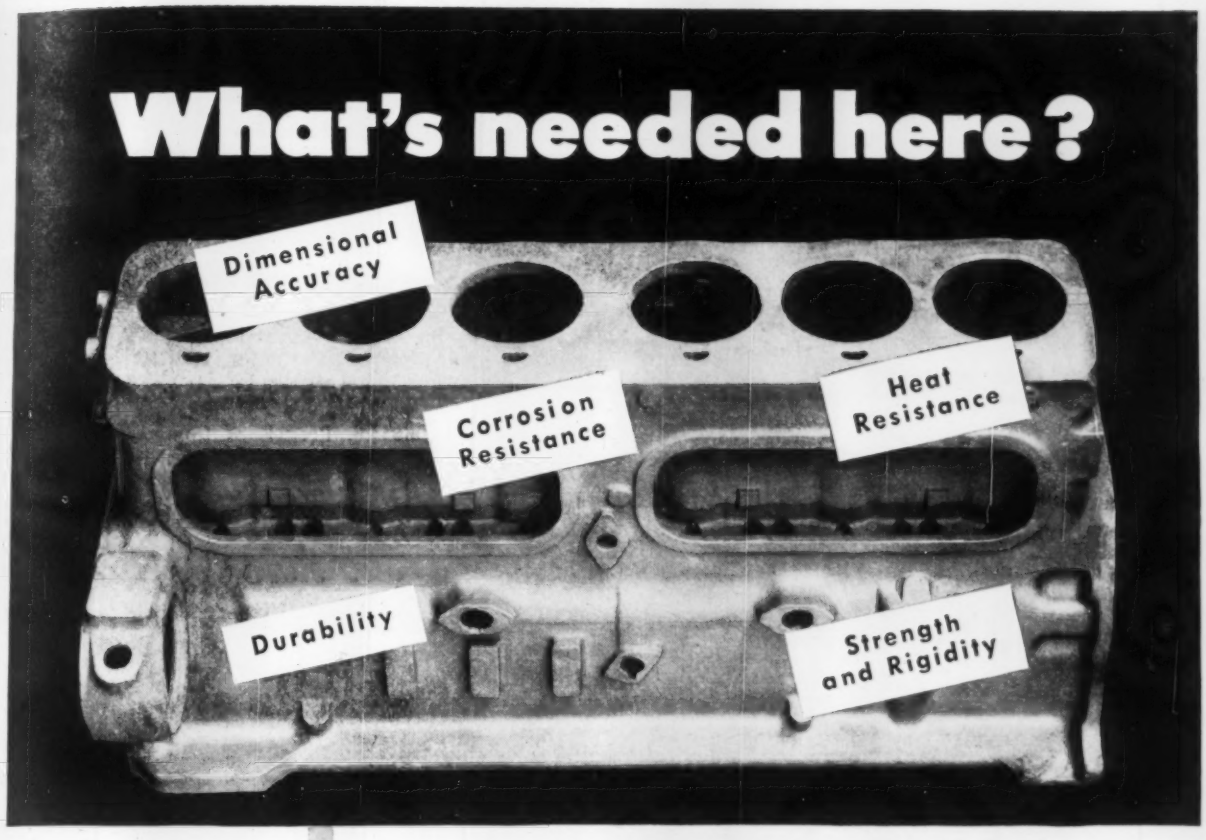
After the rate is agreed upon, then:

1. The requirements from all angles are thoroughly analyzed by both parties together.
2. From this analysis, an estimate of hours to make the simplest possible preliminary design layouts should be submitted by the vendor.
3. An order for the estimated hours for making this preliminary layout is then given to the vendor. If the layout is not completely finished when the hours on the order are reached, the vendor will stop for a further study by both parties. If the layout is finished in less time than allotted, only the time spent will be charged.
4. From the preliminary layout, an analysis by both parties will be made to determine if any changes are wanted, or if the layout is to be completed for detailing.
5. If changes are wanted, an additional allotment of time can if deemed advisable be agreed upon. This would also be true for completing the design and detailing.
6. From the approved and finished design a firm bid can be made for the building of the equipment or machine.

This procedure will prevent money being spent on something that is not wanted, since it affords the careful analysis needed at crucial stages of a design. It also gives the customer a good picture of the progress of the work, and an opportunity to make changes.

It also has been found, that in about 15 per cent of cases after the preliminary layout was made and analyzed, and all the data assembled, that the idea was given up. This saves the buyer money.

The suggested method provides a just and equitable procedure for both parties. For the one rendering the service it eliminates losses. For the buyer it eliminates the possibility of excessive charges.



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General view of sintering plant, Bethlehem Steel Co., Bethlehem, Pa. Fines from screening station are conveyed by inclined belt system to top of sintering plant bins

Screening and Charging Practice

Increases Furnace Yield

Procedure followed by Bethlehem Steel Co. in splitting ores to plus 1-inch lump and ⅜-inch nut, running the fines through the sintering plant, and charging each size in the blast furnaces separately has been highly effective in increasing production

By A. H. FOSDICK
Superintendent Blast Furnaces
Bethlehem Steel Co.
Bethlehem, Pa.

SUPPLY of iron ores available for American blast furnace consumption has undergone a radical change in the past 20 years. The Great Lakes region for many years has been supplying most of the blast furnaces in this country with fairly high-grade ores, augmented with a limited supply of foreign ores with relatively good chemical and physical properties. During this period sintering was restricted almost entirely to the agglomeration of flue dust, of which there were huge stockpiles.

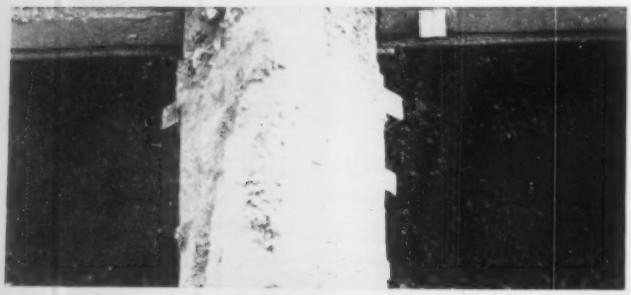
Today the blast furnace industry is faced with an entirely different situation. Mesabi and Old Range ores are approaching their final stages as a source of supply, various pig iron producers are beginning to beneficiate and agglomerate the lower grade taconites, and nearly all of the iron ore mined in New York, New Jersey and Pennsylvania requires fine grinding, concentration and agglomeration.

Ore from Sweden and South America although coarse and granular in the natural state requires crushing which in turn entails a high percentage of fines. Mediterranean and African ores are friable and contain considerable fines; even open-hearth charge ore from these areas undergoes considerable breakage on handling with an astounding percentage of fines arising.

Modern blast furnaces are layer-filled, that is, a layer of ore is charged, then a layer of limestone and finally a layer of coke. Sometimes the sequence is altered but the raw materials always are charged in layers.

Because of the adverse effect of coke fines on the smooth operation of a stack, operators 20 years ago began to limit the size of coke in the burden. Today every pound of furnace coke is subjected to screening to three sizes, namely, furnace, nut and breeze. In all cases, furnace and nut grades are charged separately for this reason:

A cross-sectional area of uniform size promotes a better gas-solid contact and minimizes the ill effects caused by size segregation, thus resulting in more



Top view of two stockhouse bins showing comparison between nut (right) and fines (left) of bessemer grade

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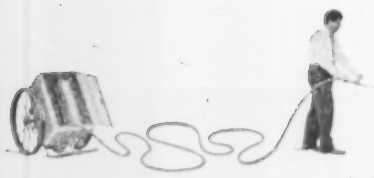

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being used mainly as a scalping screen for flue dust and ore concentrates; in fact, any fine material not requiring much screening but scalping only.

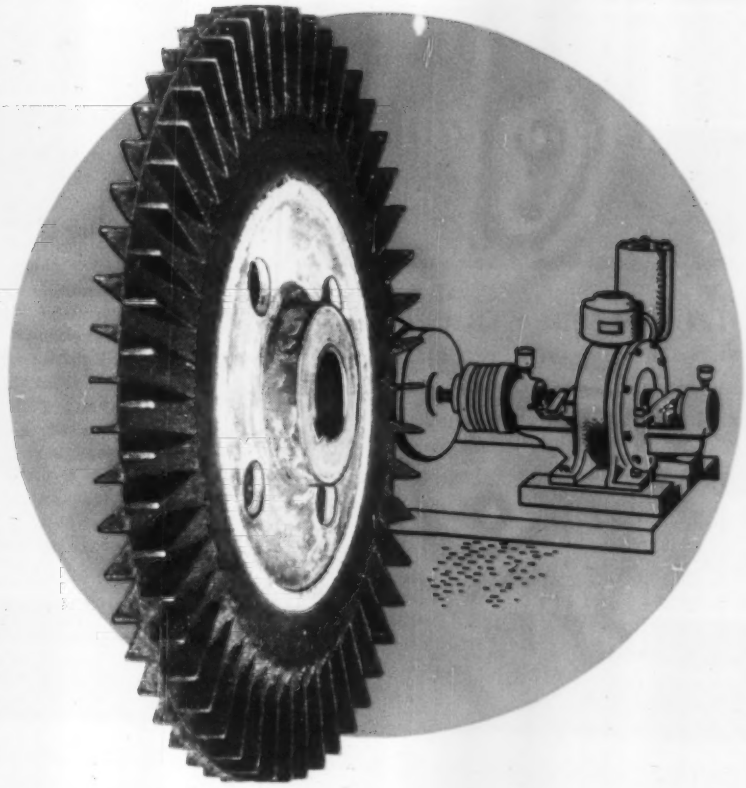
All ore used by Bethlehem is routed through a new screening station equipped with two 5 x 14 foot double-deck screens, the top deck having 1 x 4-inch openings and the lower deck ⅜ x 4-inch openings.

Incoming ore is dumped from a side-dump transfer car onto 10½ x 10½-inch steel grating thus eliminating any large lumps. Material passing through accumulates in four bins equipped with table feeders and discharging onto a 36-inch inclined belt. At the top of the incline, a hopper and deflector plate splits the feed to two 30-inch inclined belts which discharge onto the two double-deck screens. Here the ore is split into three sizes, namely, lump (plus 1-inch top deck), nut (minus 1 x ⅜-inch) and fines (minus ⅜-inch) that pass through the lower deck. Lump and nut sizes are taken from separate bins by transfer cars to the furnace bin system; the bulk of the fines is belt conveyed to the sintering plant bins. Some of the fines are charged separately in the furnace when there is a surplus over sinter mix requirements.

The accompanying chart depicts the far-reaching effects of charging ore into a blast furnace according to size. Midway in the iron production charts is indicated the point where lump and nut sizes of ore first were added to the burden and as a greater supply of these two sizes became available, the weekly average of the daily output began to increase. Referring to the chart on flue dust production and covering the same period of operation, it will be noticed that the tonnage of flue dust blown into the dust catcher decreased sharply. In like manner the lower chart shows an attractive decrease in the fuel ratio. This gives some idea of the importance of screening ores through 1 and ⅜-inch mesh, charging these sizes separately into the furnace and reclaiming the fines by way of the sintering operation.

Percentage of split ores and their analyses are shown in the accompanying table.

Screening of a bessemer grade ore recently was started at Bethlehem and because of the tight sinter mix, the nut and fines were charged separately in two stacks burdened on bessemer iron. Since then "B" furnace has averaged from 300 to 600 tons more output per week, decreased its make of flue dust from 439 to 284 pounds per ton of iron and its fuel



Found:

The 2% that cured a Pickled Pump

How years of N-B-M Metallurgical experience paid off by solving a severe problem of corrosion

When a vinegar producer suddenly starts having frequent pump failures due to extreme impeller corrosion, it's pretty evident that something unusual is going on . . . particularly when the same pump had been used successfully for years. The pump manufacturer sent an engineer to the installation . . . and found that *concentrated* vinegar was being pumped, instead of *diluted* vinegar as before. Impellers in some cases were lasting only 1 week.

The pump manufacturer came to us with the facts—and our Metallurgical Department was immediately put to work on the problem.

Result? In a matter of days, impellers of a new alloy were on their way with a slight but important alloy change . . . the addition of 2% nickel. These impellers now last 18 months to 2 years—longer than they ever had before!

We're proud of examples like this . . . because they show how effectively our facilities for Research and Engineering — combined with 75 years of practical application experience—make money-saving solutions to problems on . . .

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FOLLANSBEE COLD ROLLED STRIP is widely used in plants manufacturing toasters, tractors and television equipment where high-speed automatic machines turn out parts in astronomical numbers. Continuous feeding from coils is essential to maintaining volume.

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FOLLANSBEE METAL WAREHOUSES
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rate from 1 to 4 points. Furnace "G", which received most of the purchased coke, has produced up to 200 tons more iron per week, with a drop in flue dust production from 421 to 234 pounds per ton of iron and a decrease in the fuel rate from 1 to 6 points.

Capacitor Use Described

A power factor visualizer that presents a simple explanation of the use of capacitors in solving low power factor problems and also a new 16-page lighting-at-work booklet are available from the Westinghouse Electric Corp., Pittsburgh. Prepared in the form of a slide-rule-type chart, the visualizer makes it possible to follow a hypothetical case involving low power factor and shows how installation of capacitors can solve this, as well as many similar problems.

The chart explains just what low power factor is, what it means to both the power user and supplier, and what benefits can be obtained by improving the power factor in an industrial distribution system through installation of capacitors.

Aimed at industrial plant operators, the 16-page booklet stresses three advantages of better lighting: It cuts cost by making possible increased production; increases efficiency by insuring accuracy; and reduces accidents by clearly exposing dangerous operations.

In emphasizing that different operations in a plant call for varying amounts and types of light, the booklet analyzes the three modern light sources (fluorescent—mercury vapor—incandescent) as to type of light, efficiency, lamp life, maintenance, mounting height, and job suitability.

High Temperature Carbon Steels

Searching for materials which will alleviate the short supply of certain strategic elements, the Cornell Aeronautical Laboratory reports "substantial progress" in turning out certain low alloy steels which are usable in high-temperature applications, according to the annual report of Dr. Clifford C. Furnas, laboratory director.

One of the programs at the laboratory deals with the modification of plain carbon or low-alloy steels by minor changes in composition as well as heat treatment which will make them usable for high-temperature application. Progress has been made in the modification of certain steels with small amounts of titanium and boron. With proper composition and appropriate heat treatment, the practical temperature range for use can be extended several hundred degrees.

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_____ Federal Specification Chart _____ Vapor-Wrapper book

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COMPANY NAME _____
(or use company letterhead)

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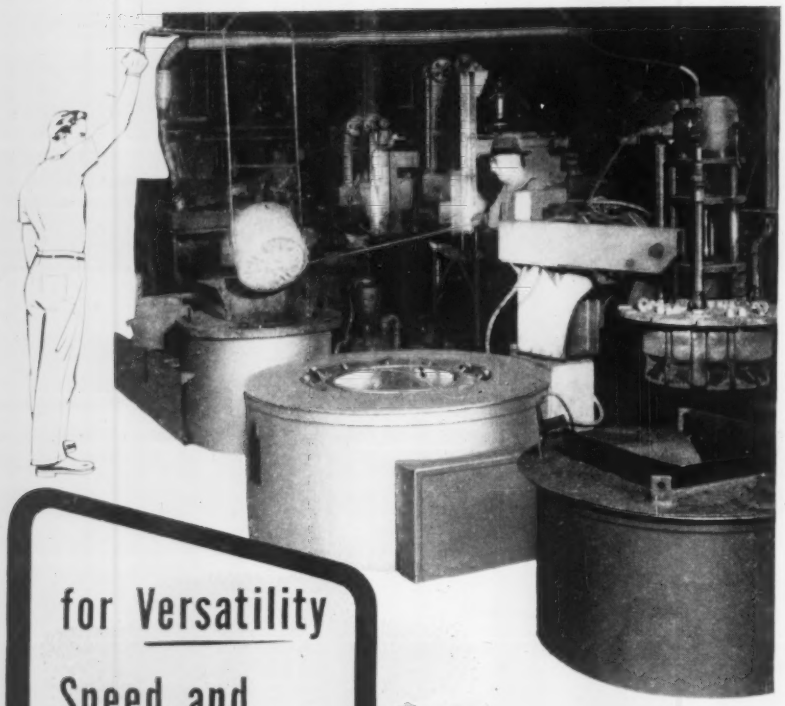

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Speed and
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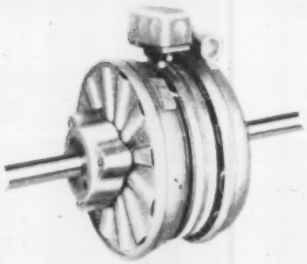
in their
Heat Treating Department



This combination ICB electric clutch and brake, manufactured by Warner Electric Brake & Clutch Co., has many parts heat treated in Hevi Duty Furnaces.

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Ceramic Coatings Prevent Exhaust Gas Corrosion

AN investigation of the corrosive effects of lead bromide vapors on various heat-resistant alloys, both with and without protective ceramic coatings, was recently completed at the National Bureau of Standards. Lead bromide, the principal lead compound present in aircraft exhaust gases, has been suspected of contributing significantly to exhaust-system corrosion.

Until now, however, available data bearing on this question have been few and inconclusive. The NBS investigation demonstrates that the uncoated alloys corrode fairly rapidly when exposed to lead bromide vapors at high temperatures, but that certain ceramic coatings effectively prevent corrosion under the same conditions.

Gases Heavily Leaded—Lead bromide is present in the exhaust gases of all engines that use leaded gasoline as a fuel. Aviation gasoline is more heavily leaded than automobile fuel, however, and aircraft exhaust temperatures are higher. For these reasons, corrosion from lead bromide is a greater possibility in aircraft than in automobiles. The fact that lead bromide vapors prove corrosive under certain conditions does not, of course, mean that leaded gasoline is undesirable as a motor fuel.

Lead bromide found in exhaust gases results from the interaction of tetraethyl lead and ethylene dibromide, the active additives of leaded gasoline. The tetraethyl lead is added to improve combustion characteristics, while the ethylene dibromide acts as a scavenging agent. In this capacity the ethylene dibromide converts the lead oxide, which would otherwise be formed during combustion, into lead bromide. Lead bromide has a considerably higher vapor pressure than lead oxide and is therefore more readily passed through the exhaust system as a vapor.

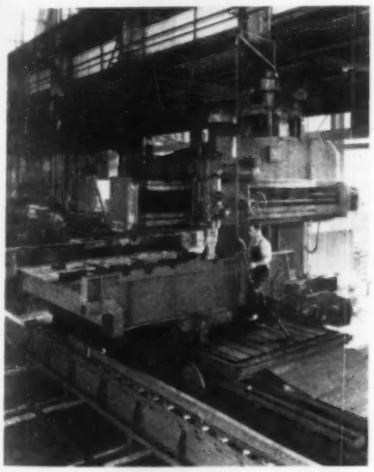
Five Alloys Tested—Five heat-resisting alloys were investigated: Inconel (a high nickel alloy), types 347 and 19-9DL stainless steels, Vitallium and S-816. The first three alloys are in regular use in exhaust systems. Vitallium and S-816 are turbine blade alloys and, although too expensive for general exhaust system use, could be used for small critical parts. Specimens of each alloy with five different coating conditions were studied: An uncoated specimen, a preoxidized specimen, and three ceramic-coated specimens. The ceramic coatings, all commercially available, were NBS types A-417, A-19, and

A-320. Specimens were exposed to lead bromide vapor for periods up to 6 hours in an air atmosphere at temperatures of 1350, 1500 and 1650° F.

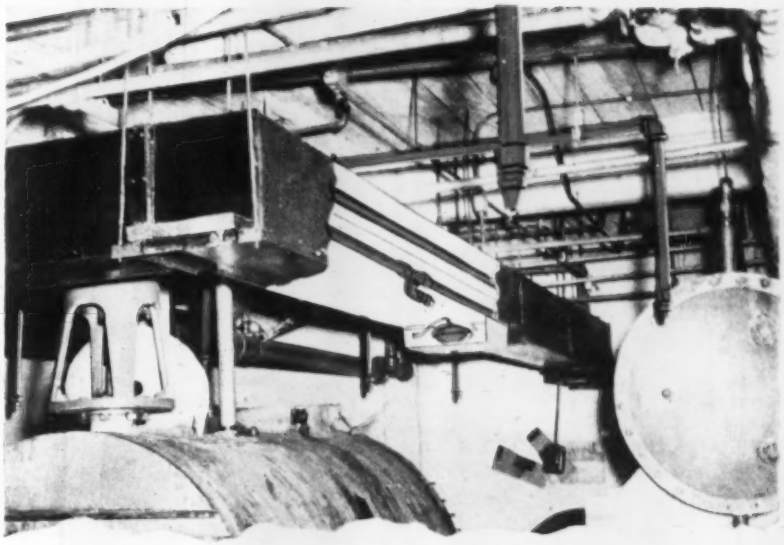
In the investigation, a small furnace was first preheated to the desired temperature. After temperature equilibrium had been reached, the lid was removed and a 1-gram charge of chemically pure lead bromide was dropped into the furnace. A second lid, from which eight alloy specimens were suspended, was then quickly put into position. This lid fitted loosely and allowed some air to diffuse into the furnace. Determination of the effectiveness of the ceramic coatings did not necessitate that the lead bromide vapor concentration be kept constant.

Each batch of specimens was heated in the furnace for a total of 6 hours. At 1-hour intervals, however, the specimens were removed, examined and then replaced together with a new charge of lead bromide. This hourly examination included cleaning a limited area of the specimens—which were in the form of flat strips—and measuring the loss in metal thickness from corrosion. Loss in weight was also measured in some instances. At the end of the tests, cross-sections of the specimens were studied microscopically, and both the scale layer and the cleaned alloy sur-

Canadian Firm Gets Big Miller



MACHINING an all welded trolley frame for a 60-ton crane to be installed in a heavy machine shop is an open side Plano-milling machine recently installed in one of the machine shops at Dominion Bridge Co. Ltd., Lachine, Que. It is the largest machine of its type ever made by Kendall & Gent, Manchester, England, and has already demonstrated ability to cut operating times and costs in machining of crane components



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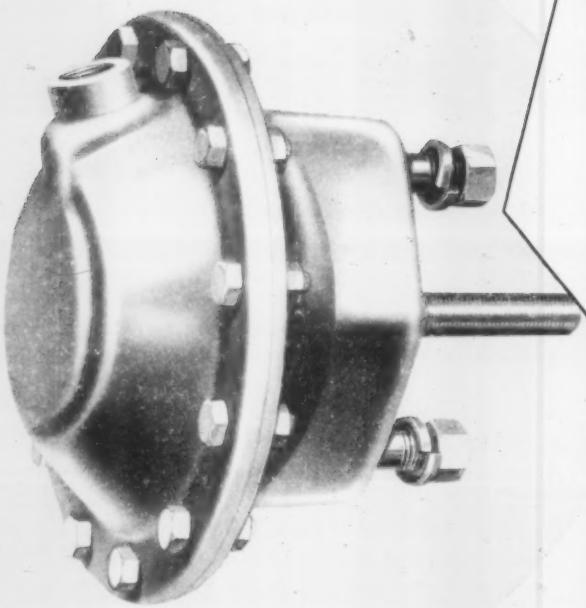

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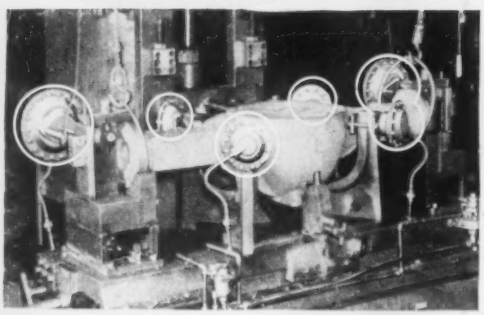
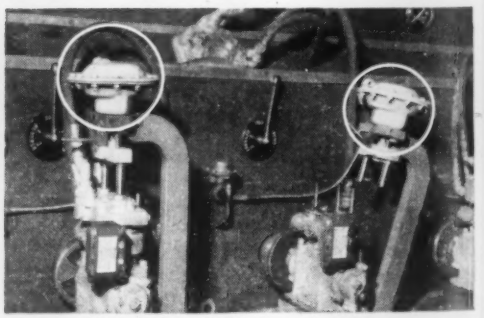
A rugged air chamber that may be used wherever a short, powerful stroke is needed for holding, positioning or clamping. Produced in six different sizes with strokes from 1¾ inches to 3 inches. Also available is a smaller diameter ROTOCHAMBER which provides an even longer stroke with a similar pressure output. Your present air supply will be adequate for either, but compressors are available if needed.



SAVES MONEY

Savings realized on this operation for manufacturing axle housings by replacing hand screws and clamps with Robotair Chambers have amounted to hundreds of dollars.



CUTS HANDLING TIME

Before installation of Robotair on this compressor run-in test line, compressors were held in position by manually operated clamps. Simple adaptation of Robotair Chambers and two-way valves cut handling time in half.

...AND STEP UP YOUR PRODUCTION AS MUCH AS 30% WITHOUT ADDING MANPOWER

Amazing Savings in Time, Money and Effort

Bendix-Westinghouse, world's largest source of air brakes and other air devices, put more than a quarter century of experience behind the development and perfection of Robotair Industrial Controls. With their wide range of applications, these air controls now offer progressive manufacturers amazing improvements in production speed and economy at an *unbelievably low initial cost.* Ideal for holding, clamping, bending, swedging, staking, riveting, and compactly designed for easy installation on space limited machinery, Robotair Controls inevitably bring about lower manufacturing costs per unit through increased productivity of man and machine. Rugged, frictionless, leak-proof construction positively eliminates need of oilers and filters and assures millions of strokes at *100% efficiency for total life.* Low cost Robotair units are available as original equipment for machinery manufacturers or for installation on present shop equipment. To find out how Robotair can improve your production picture, send for your copy of the colorful Robotair booklet. Coupon at bottom of page.

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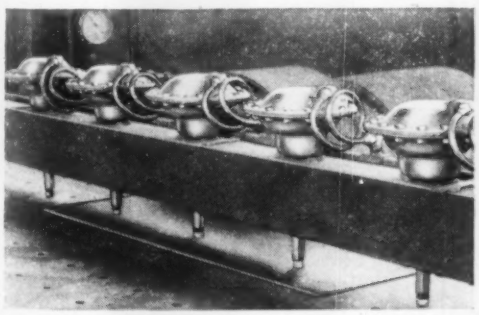

REDUCES OPERATOR FATIGUE

Various sizes of steel plates are held in position by series of Robotair Chambers in this end grinding operation. Use of Robotair eliminated battery of hold down bolts and clamps, greatly reducing operator fatigue.

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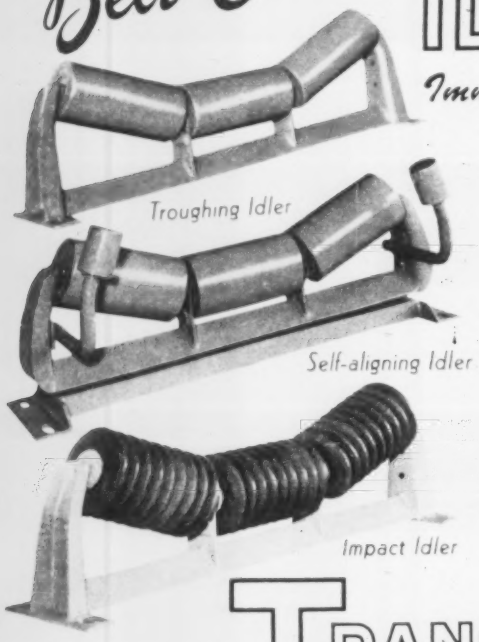

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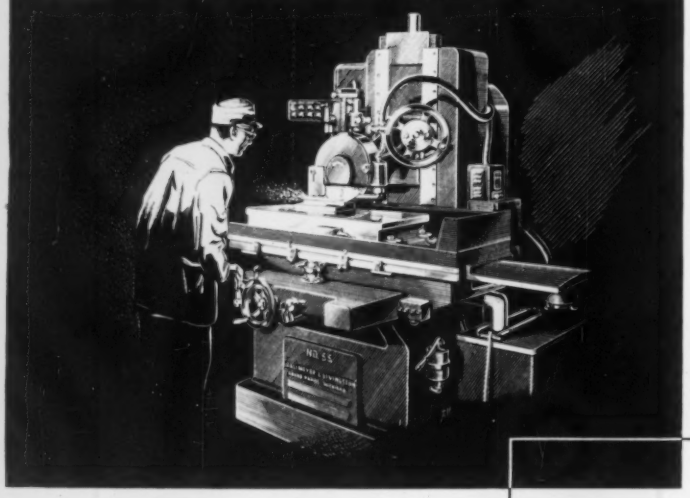
WHEN THE DECISION IS PRECISION...



Where extreme tolerances are not required, the choice of any particular grinding machine may not be too important. But, where absolute precision is demanded, the choice is usually *Grand Rapids*.

Defense orders make it impossible to fill orders as quickly as we desire—but we know our customers can appreciate the reasons for delay. As always we'll do our best to serve you.

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face were examined spectrochemically for lead content.

Resistance Varies—Large differences in the resistance of the several alloys to attack by lead bromide were found. Although all five uncoated alloys suffered corrosion at all test temperatures, the loss of thickness in the full 6-hour period ranged from 1.2 to 10.1 mils. Alloys S-816, Vitallium, and Inconel were notably more resistant than were the 19-9DL and type 347 stainless steels, both of which are high-iron, austenitic-type alloys. Microscopic examination indicated that a selective attack took place with the 19-9DL and 347 steels, leaving a spongy layer near the surface. With the other alloys, however, little selective penetration was found.

Preoxidation of the surfaces of the alloys tended to retard corrosion for the first hour or two only, after which corrosion proceeded at an undiminished rate. Preoxidation was accomplished by heating specimens in air for 4 hours at the test temperature.

No consistent relation was found between temperature and rate of corrosion; some but not all of the alloys showed less corrosion at the higher temperatures. Similar results have been reported by other investigators of alloy corrosion and are apparently not unusual. However, it must be remembered that in the test method the lead bromide concentration probably dropped off more rapidly with time at higher temperatures than at lower temperatures. Thus at 1650° F a 1-gram charge of lead bromide may have left the furnace as vapor in a few minutes, whereas at the lower temperatures a 1-gram charge probably fed vapor into the furnace atmosphere throughout the entire 1-hour heating period.

Diesel-Powered M-G Sets for TV

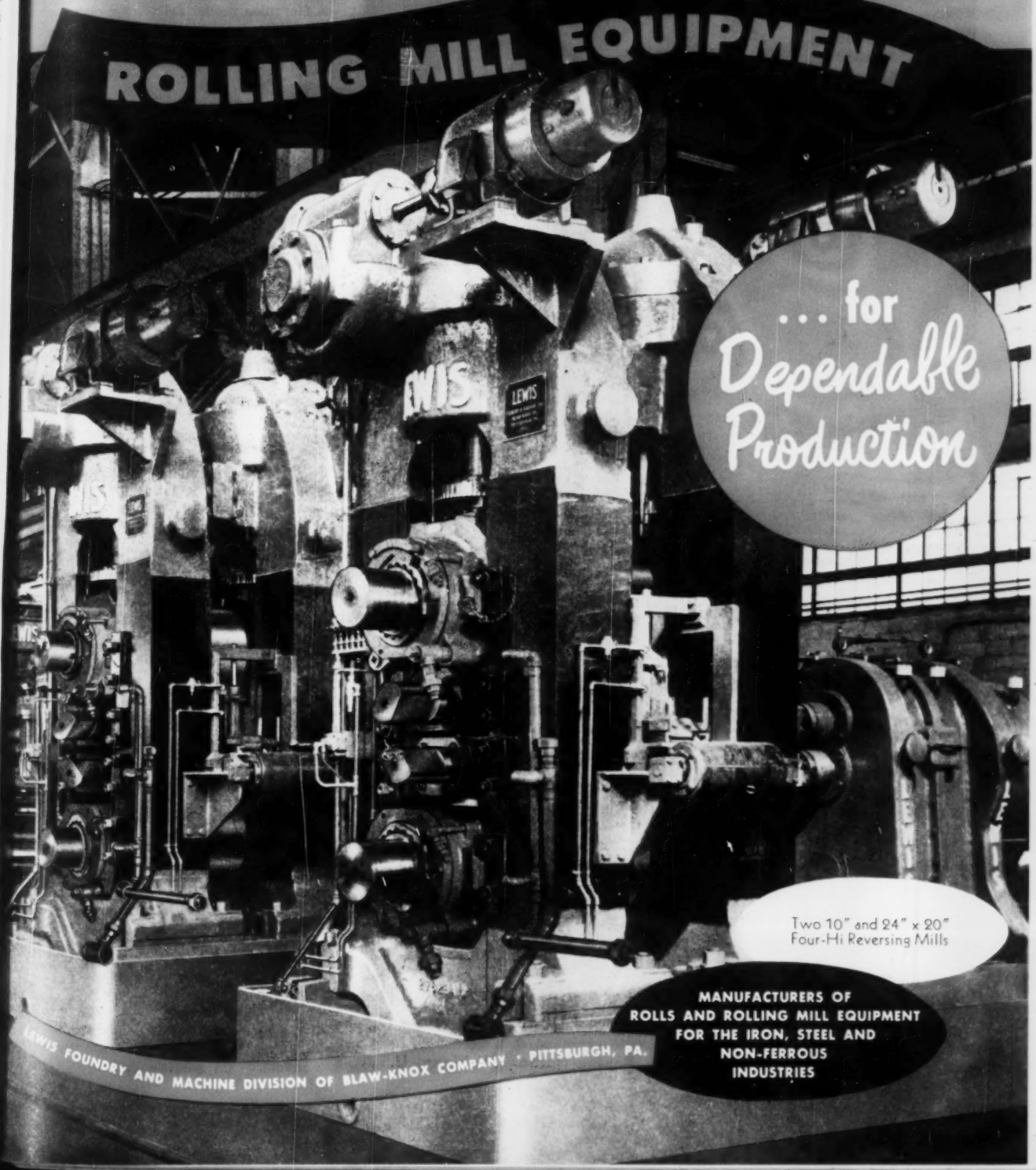
Microwave relay towers for transmitting telephone mesages and television picture images have been widely used as an alternative to coaxial cable extensions, and many densely-populated areas owe their ability to receive "live" television broadcasts to the rapid expansion of microwave-relay systems.

Importance of the dependable functioning of the relay tower is so great that standby electric power generating equipment is universally used which activates itself in the event of a local power failure. Whenever power is not available locally or where the amount of available power is not sufficient, two gasoline engine powered generator sets are often used alternately, the idle one serving as a standby unit.

With expansion of television westward into more isolated and sparsely

LEWIS

ROLLING MILL EQUIPMENT



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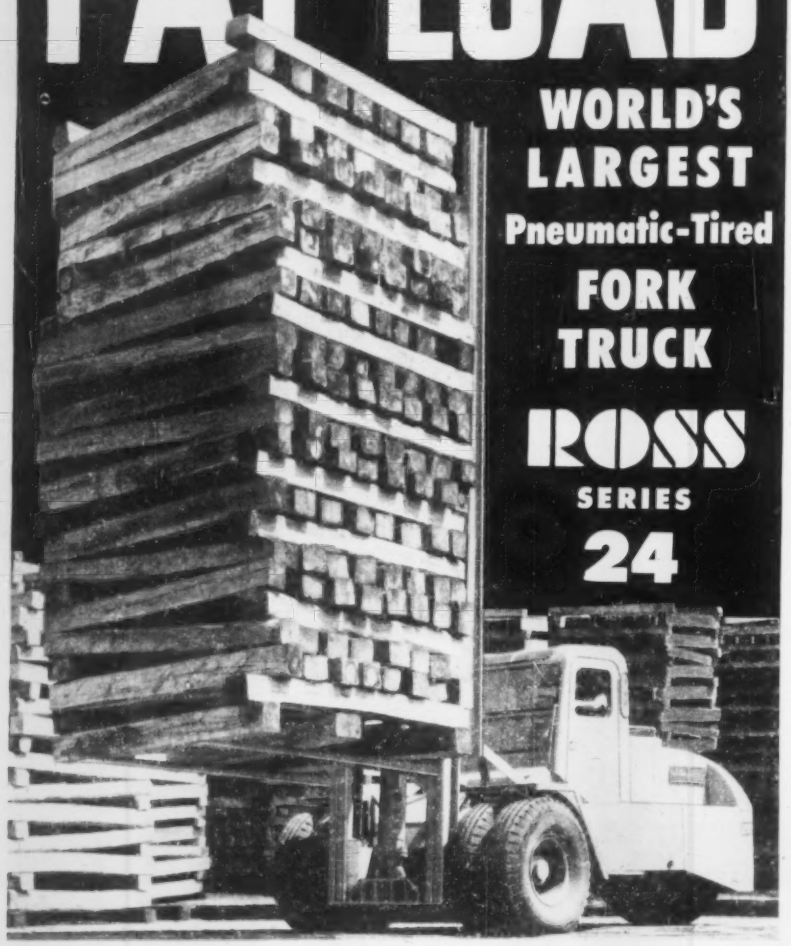

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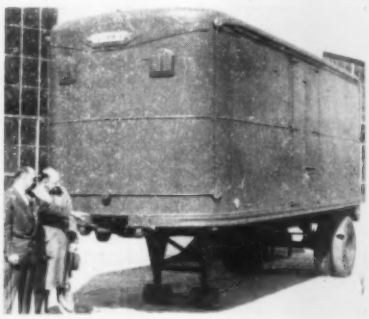
populated areas with limited power supply the unusual merits of the diesel engine as a means of dependable economical power has been given wide and serious consideration. Development of communication equipment that must function dependably for months at a time in isolated areas, and in some seasons of the year difficult of access, poses a new set of requirements. Meeting these requirements has been one of the interesting experiences of Hercules Motors Corp., Canton, O. A generator set was developed and powered by a Hercules model DJXH six-cylinder diesel engine with a $3\frac{3}{4}$-inch bore, $4\frac{1}{2}$-inch stroke and piston displacement of 298 cubic inches.

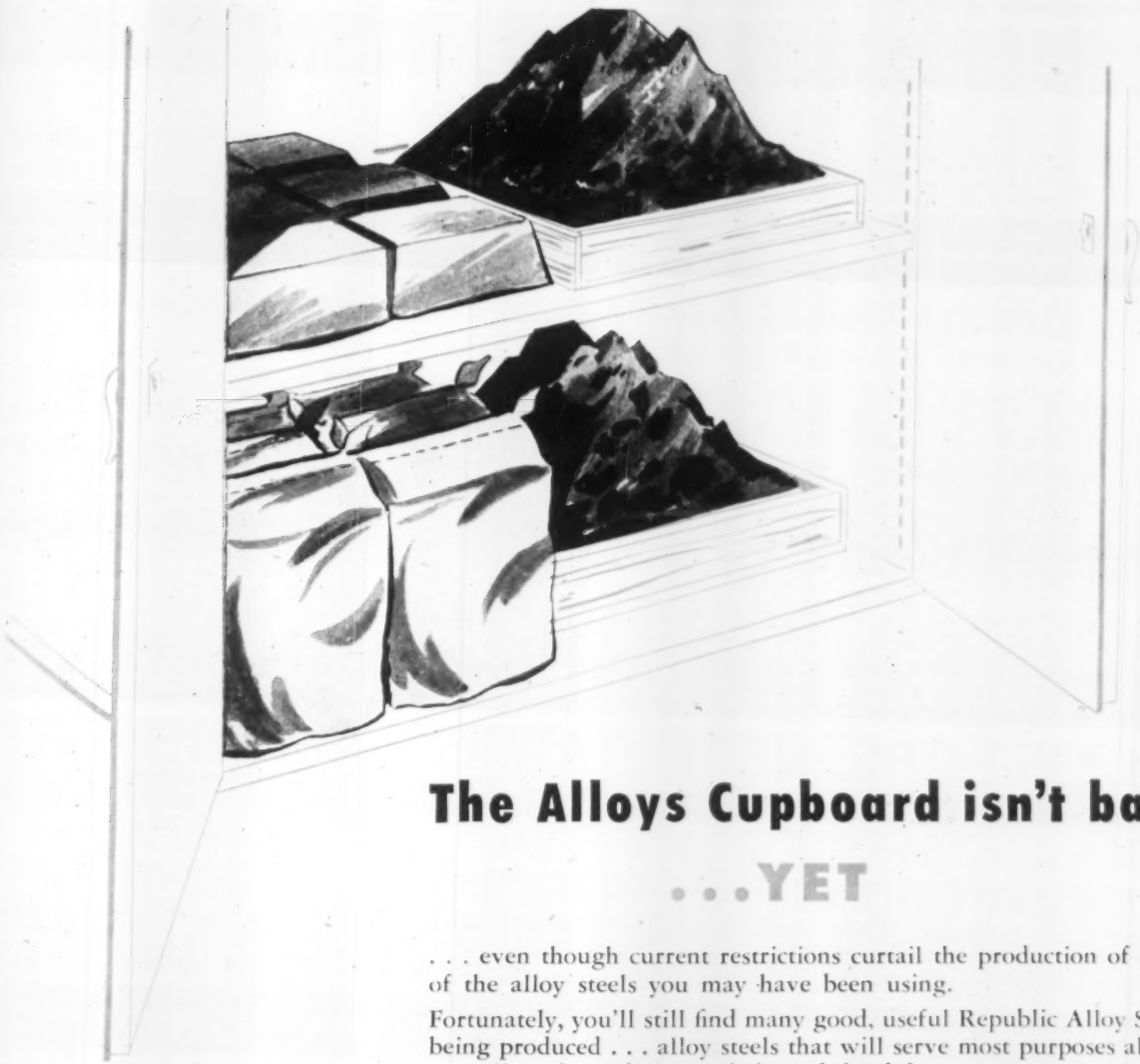
First installation of their diesel engine powered generator sets at a microwave-relay station is at Omaha, Nebr. and consists of four units. It is expected eventually to join Omaha to San Francisco through a series of microwave-relay towers. Other installations are planned in connection with the extension of TV relaying equipment through Utah, Nevada, Virginia, Alabama, Mississippi and throughout Texas. Where localities do not have a power supply, these units can be used to operate the television broadcasting station itself.

Present uses of the microwave-re-

Safety Added for Hot Cargo



ORDINARY safety precautions aren't enough when designing a trailer for hauling explosives, so Trailmobile Co., Cincinnati, did a special job in designing trailers like the one shown above for the Kingsport, Tenn., plant of Holston Defense Corp. To prevent sparks from being struck by friction between metallic surfaces special aluminum stripping was installed around doors. All electrical wiring is carried in metal conduit on the outside of the trailer. Josef Weber, manager of the company's Cincinnati plant, points out another special feature to Paul Heasley, controller and assistant treasurer—it's an automatic propping arrangement that can be operated from the cab for detaching the trailer instantly in an emergency



The Alloys Cupboard isn't bare

. . . YET

. . . even though current restrictions curtail the production of some of the alloy steels you may have been using.

Fortunately, you'll still find many good, useful Republic Alloy Steels being produced . . . alloy steels that will serve most purposes almost as well as those that are victims of the defense movement.

Your problem of selecting the best available alloy steel and putting it to work on your production line will be a lot easier with the help of the team from Republic . . . the Republic Field, Laboratory, and Mill Metallurgists.

In all probability, there is an available alloy steel which will be suitable for your production. A Republic Metallurgist will gladly work with your staff to determine which one is best and how to process it most efficiently.

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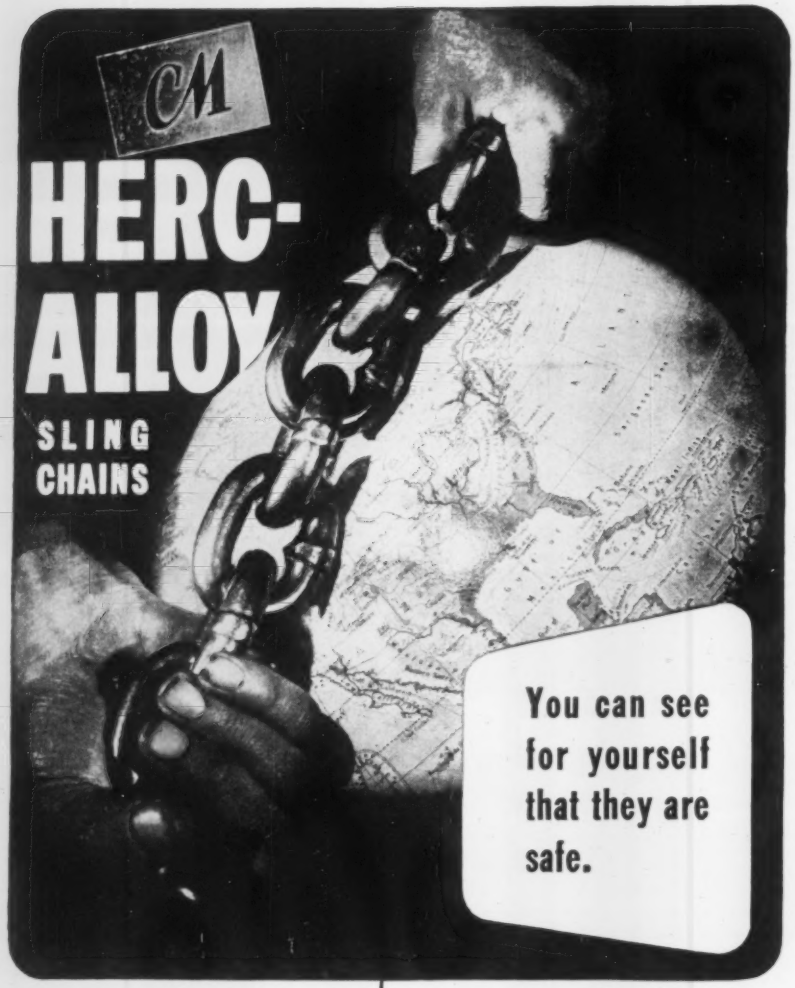

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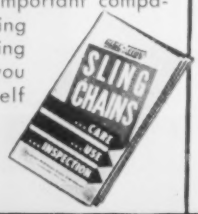

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- America's *first* alloy steel sling chain... first to bear a serial number.
- *Every* CM HERC-ALLOY Sling Chain is alloy steel throughout... links, rings, hooks. There is only one grade... *the best.*
- Every chain is individually tested and accompanied by a certificate of registration.
- Links are side welded for maximum strength by patented INSWELL electric method.
- HERC-ALLOY Chains should *never* be annealed.
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lay towers are believed by many officials in communications to represent only a fraction of their potential usefulness in the years ahead. Scope of their future development includes transmission of great numbers of telephone conversations and telegraph messages.

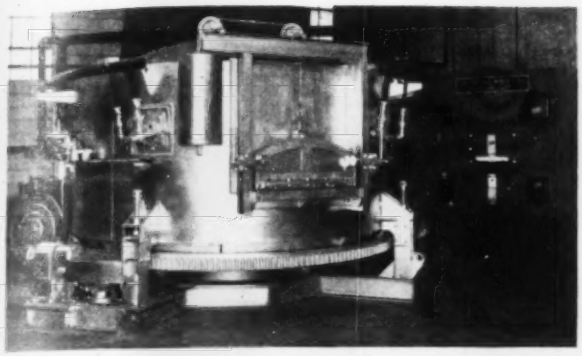
Plastic Deformation of Chromium-Plated Steel

CHROMIUM plating, because of its hardness and ease of application, is widely used on various machine elements to protect softer metals from wear and to salvage worn or undersized parts. However, the advantages of chromium plating are sometimes offset by a reduction in the ability of the basis metal to deform plastically without breaking. To learn more about the effect of chromium plating on the plastic deformation of steels used in aircraft, the National Bureau of Standards recently made a comprehensive study of the mechanical properties of chromium-plated SAE 4130 steel. Results of the investigation provide information of interest not only to aircraft manufacturers but also to a number of other industries which produce or utilize chromium-plated machine parts.

The NBS investigation included tensile, tensile impact, bending and crushing tests of specimens prepared from rod and tubing of SAE 4130 chromium-molybdenum steel heat treated to a hardness of about 40 Rockwell C before final machining. Some of the specimens were tested as machined, without plating; others were tested after plating to one or more thicknesses; and still others after both plating and subsequent baking at various temperatures up to 440° C. The effect of baking was of interest since the usual commercial practice is to bake chromium-plated steel articles at a temperature of 200° C for several hours subsequent to plating.

Baking May Relieve Effect—Data obtained in all except the tensile impact tests indicate that chromium plating appreciably reduces the plastic deformation that can occur in SAE 4130 steel before fracture. Generally, however, the ability of the plated specimens to undergo plastic deformation was substantially increased by baking at temperatures between 100° and 440° C.

Tensile tests were made on specimens plated to nominal thicknesses of 0.0001 to 0.015-inch, as well as on the unplated specimens. Average values for the tensile properties of the unplated steel were as follows: Tensile strength, 187,300 psi; yield



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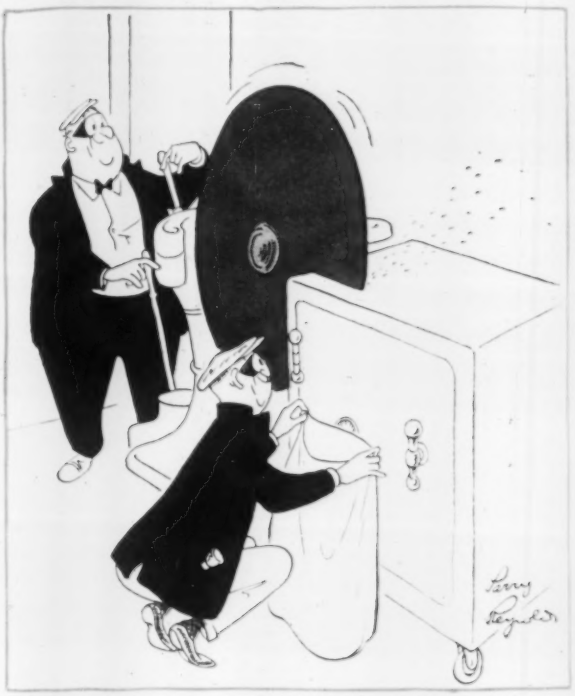

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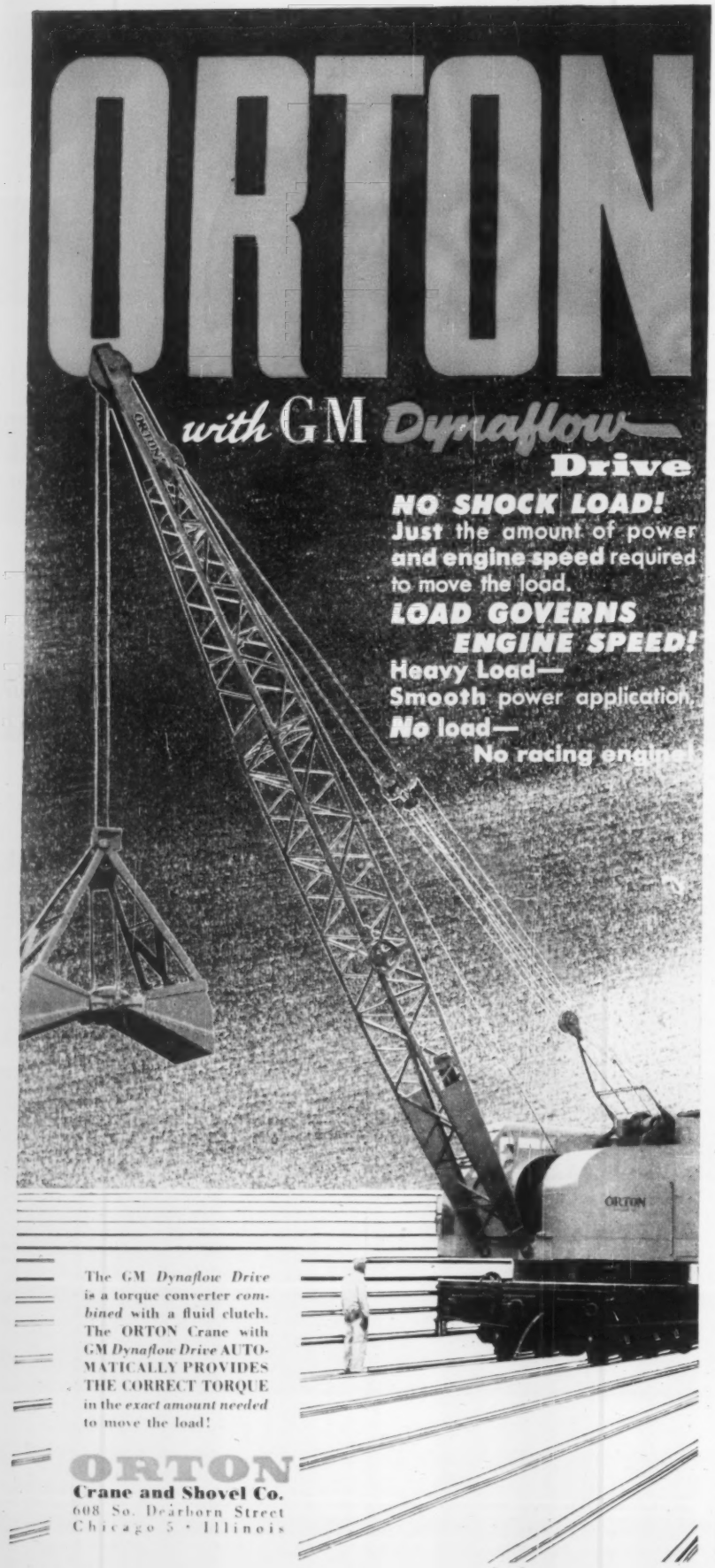
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strength, 175,900 psi; elongation in a 2-inch length, 13 per cent; true stress at beginning of fracture, 270,900 psi; original area of specimen divided by area at beginning of fracture, 2.088.

It was found that the tensile and yield strengths decreased with increasing plate thickness until, at a thickness of 0.015-inch, the values were about 90 per cent of those for the unplated steel. Baking at 200° and 400° C did not produce any appreciable change in these properties.

Plating to a thickness of 0.010-inch reduced the true stress at beginning of fracture to about 80 per cent and the percentage elongation and true strain at beginning of fracture to less than 60 per cent of that of the unplated steel. However, the baking of plated specimens at 200° or 400° C appreciably increased the values obtained for these properties.

Impact Off 7 Per Cent—Tensile impact tests were made with the cooperation of the New York Naval Shipyard. These tests were conducted at room temperature; the striking velocity was 27.8 feet per second. The unplated steel elongated 15.8 per cent, absorbing 464 foot-pounds of energy at failure; reduction in area was 55.2 per cent. The tensile impact properties of plated specimens were 93 per cent or more of those of the unplated steel and were not appreciably changed by baking at temperatures up to 300° C.

Bend tests were made in a universal testing machine on specimens having a diameter (before plating) of 0.500-inch and a length of 10 inches. Although unplated specimens could be bent as far as possible in the machine without failure, specimens plated to a thickness of 0.015 inch failed after they had been bent through an angle of about 40°. On the other hand, plated specimens baked at temperatures of 200° to 400° C could be bent through angles of 70° to 85° before failure. The moduli of rupture of plated specimens baked at these temperatures were equal to that of the unplated steel.

In crushing tests, specimens machined to close tolerances from heavy-walled tubing were tested either as machined, after plating on the inside and outside surfaces to a thickness of about 0.010-inch, or after plating to this thickness and baking at temperatures between 100° and 400° C. The specimens were tested to failure by compression between the stationary and movable heads of a universal testing machine in which the load was applied along a diameter of the tube. Plating increased the load necessary to crush the specimen by a

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The plant doctor and first aid department look after sick or injured workers, but when a machine or department is threatened with "down time" medical science is helpless while production costs rapidly rise.

But there is a man you can phone, just as you would call the doctor, or the fire or police department, and he will get on the job just as quickly, supplying the parts, materials or knowledge needed.

Emergency cooperation is this man's specialty. He has at hand about every remedy a machine or factory could need for any kind of trouble. He has prepared himself to meet the special requirements of the plants in his locality. Just pick up the phone and call him.

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"This man" is an industrial distributor* or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock for your money saving convenience Bunting Standard Stock Industrial Bearings, Electric Motor Bearings, and Precision Bronze Bars—ask him for catalog.

* There are approximately 2,000 Industrial Distributors serving every industrial section of the United States. In 1948 their total sales were more than $3,000,000,000. They carry an average inventory of $500,000,000, turn their stocks 5 to 6 times per year, fill 200,000 orders per day, have 12,000 outside salesmen and engineers, 10,000 inside telephone order expeditors, operate 8000 trucks delivering merchandise on which their average net profit is .0292 cents per dollar of sales.

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factor of about 1.2 and reduced the deformation at failure to approximately 9 per cent of that of the unplated steel. Baking at temperatures of 200° to 400° C increased the load necessary to produce failure about 1.4 times and increased the deformation to about 55 per cent of that of the unplated steel.

It is possible that hydrogen deposited with the chromium during plating may be a factor in reducing the amount of plastic deformation that the steel can withstand before fracture. Baking of plated specimens removes hydrogen from the chromium and hence may be expected to increase the ability of the steel to withstand plastic deformation.

Electrode Life Extended

Explanation of "slope control", a new control system that extends electrode life 20 to 30 times when spot welding aluminum with ordinary alternating-current welders, is contained in the current Technical Advisor, No. 15, just issued by Reynolds Metal Co., 2500 South Third St., Louisville. Copies are available without charge.

The article details results of tests made with the new control system which restricts the flow of welding current during the first few cycles, allowing the welding current to build up gradually to maximum. This produces a gradual softening of metal under the electrode tip, helps maintain tip pressures, and holds down tip temperatures, thus reducing "sticking" almost to the vanishing point.

Magnet Wire Standards Revised

Revised standards for Ceroc 200 and Ceroc T high-temperature magnet wires are shown in engineering bulletins 403B and 402F, just released by Sprague Electric Co., North Adams, Mass.

These wires are finding wide use in miniaturization programs for military electronic and aircraft components, since their combination of ceramic-silicone and ceramic-Teflon insulations permits much higher continuous operating temperatures. Both wires are manufactured in the range of sizes from Nos. 16 to 44 AWG. Ceroc 200 is capable of operating continuously up to 200° C, while Ceroc T wire may be operated up to 250° C continuously and up to 300° C for short periods of time.

Time and Motion Brochure

"What's New in Motion and Time Study and Allied Fields, 1940-1950," is the title of a 100-page brochure prepared by the Department of Management and Industrial Engineering, University of Southern California, Los Angeles. Booklet contains summaries of articles on time and motion study listed in the Engineering Index and Industrial Arts Index. Subjects included are: Cost reduction, estimating, methods analysis, micro-motion study, motion economy, motion study, time standards, time study, wage incentive plans, and work simplification.

Copies are available from the university for $2.50 each.

Model Kit Aids Truck Buyers

Design and order your own truck body and still get a mass production job. This seemingly contradictory feat can be achieved with a model kit which Fruehauf Trailer Co., Detroit, supplies to prospective truck body buyers. There are over 500 options which can be exercised to make the body fit the needs of the particular business in which it is going to be employed.

It enables the prospective purchaser to assemble his own model in cardboard and study advantages of each

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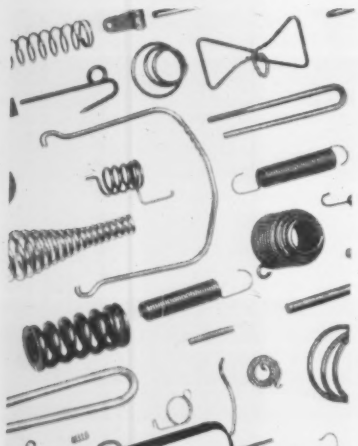

IF YOU PRODUCE munitions or any rearmament item, it will pay to check first with Cuyahoga on engineering, design and application of coil springs, wire parts, wire forms and stampings used in your production.

Cuyahoga's engineers and wire part craftsmen stand ready to serve you . . . ready to improve, speed or simplify design or operation . . . ready to give you the benefit of 46 years of peacetime and wartime experience.

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10200 BEREA ROAD • CLEVELAND 2, OHIO

This casting eliminates copper plating and saves production costs

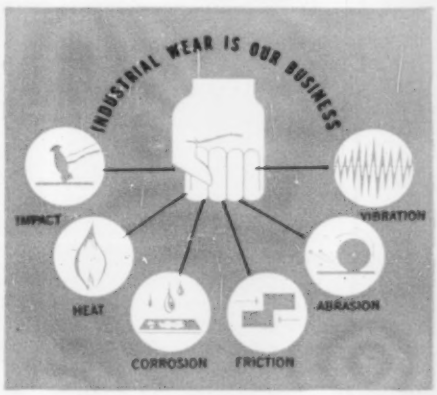
The business end of this super meat chopper will produce up to 20 pounds of meat per minute. The housing that guides the meat is a casting made of Chemalloy N-2 (Ni-Resist) which is resistant to wear and corrosion from meat juices and prevents iron contamination.

The alloy eliminates the necessity of copper plating before the final chrome finish, saving both scarce and costly material and production time.

This gravity feed chopper offers 50% greater speed and easier and cleaner work without mashing or heating the meat. It is widely used in hospitals, restaurants, hotels and food stores. Our Electro-Alloys Division filled the needs of the Toledo Scale Company for an exceptional casting.

This is just one of the many cast parts ideally suited to Brake Shoe Chemalloy. The difficult casting is held to close tolerances, is remarkably free from porosity and imperfections; and is of a uniform and closely grained structure.

Electro-Alloys invites your inquiries concerning quantity high alloy castings. Write Department G for brochure T-155 on heat and corrosion resistant alloys.



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In Los Angeles his name is Joe, in Cleveland it's Harvey. Like his "brothers" in principal cities throughout the country, he is *your* key to lower steel inventories, more helpful information, *complete assistance* in the use of tool, alloy, or stainless steel. He's the fellow on the telephone order desk at your nearest Carpenter MILL-BRANCH WAREHOUSE.

The first time you call him, you'll discover you're getting something *more* than "just steel service". For he is backed by a MILL-BRANCH WAREHOUSE organization. It embraces "trouble-shooting service" right in your own plant. It is backed by trained delivery crews and modern equipment to process orders, fast.

Most important—it is *part and parcel* of the specialty Mill in Reading. Every time you call your Carpenter MILL-BRANCH WAREHOUSE you benefit from Mill Laboratory and Metallurgical Help, Mill Quality Controls—*comprehensive Mill Service.*

Truly, it's almost like having a *specialty* steel Mill right next to your receiving dock!

Whenever you want specific job recommendations, help with a problem or top-quality steel, get it by calling Carpenter. Try it and see. Simply pick up your phone and talk to the man on the order desk at your nearest Carpenter MILL-BRANCH WAREHOUSE or Distributor. The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

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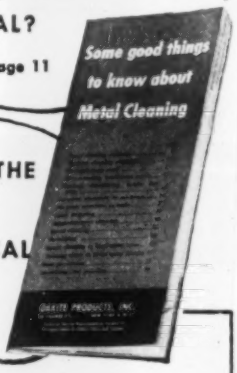
WHAT'S THE FASTEST WAY TO CLEAN METAL?
See page 11

WHAT'S THE MOST ECONOMICAL WAY?
See page 9



Oakite's New FREE Booklet on Metal Cleaning

answers many questions that mean better production for you, more money in your pocket. Check this *table of contents* for cleaning jobs you'd like to improve:

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- ☐ Machine cleaning
- ☐ Electrocleaning steel
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- ☐ Pickling, deoxidizing, bright dipping
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set of options he is considering. When assembled, the model provides a replica of the body desired.

Two-Way Radio Cuts Truck Idle Time

USE of two-way radio to speed movement of goods in some factories and warehouses by as much as 25 per cent was demonstrated by Automatic Transportation Co., and Motorola Inc., at the Materials Handling Exposition in Chicago recently.

The technique is similar to radio dispatching of taxicabs. It combines fast communications with mechanized

handling to reduce the time lift trucks spend without a load. Merchandise waits less time for movement, and the entire handling system becomes more efficient.

Fully informed on the location of all merchandise and each lift truck in the fleet, a central dispatcher issues orders by radio to truck operators. By sending trucks directly from a completed job to a new assignment, he eliminates the need to return to a central point for instructions.

Transmitting as well as receiving equipment is mounted on each truck beside the driver, so he can report when a job has been finished. Also, if he observes potential jobs while he is in transit, he can advise the controller.

Color Lighting Guide Available

A simplified lighting guide for commercial and home decoration, the new "Color Is How You Light It" book announced by Sylvania Electric Products Inc., analyzes the appearance of 40 popular colors under eight white light sources now available. It also suggests both first and second choice of light source for each color sample.

The new book is an improved and expanded version of the original introduced two years ago, and includes

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ENGINEERS

TO TOOL AND EQUIP YOUR PLANT FOR THE BEST PRODUCTION ECONOMICS

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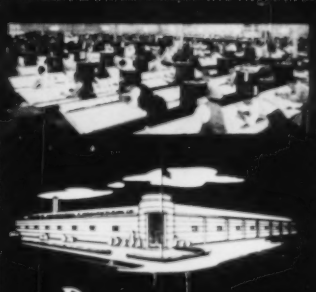

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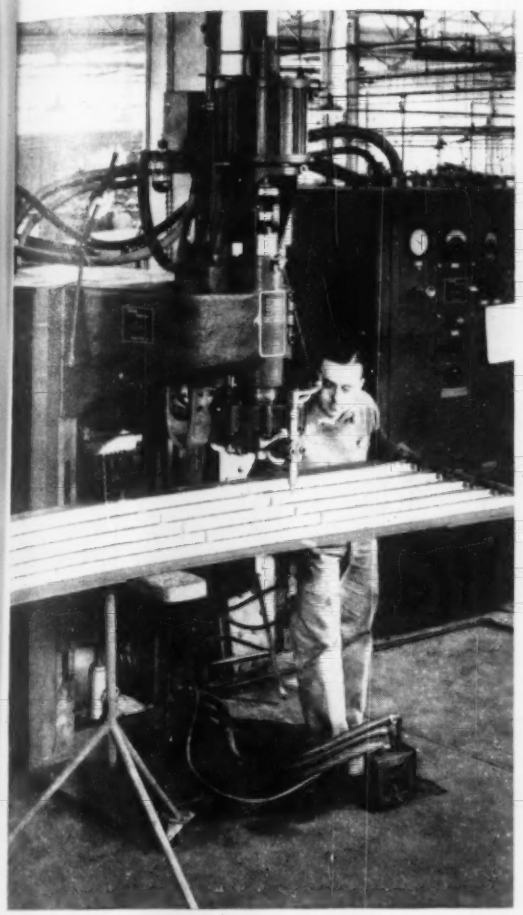

WELDING—All forms of welding can be done on aluminum. Shown here is a production set-up on a condenser-energy machine for spot welding an aluminum panel.

BRAZING—Aluminum can be brazed by torch, flux bath and furnace methods. Flux bath and furnace brazing (shown here) are excellent methods for making strong, tight assemblies, involving joints inaccessible by any other method.

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SYRACUSE 2, N. Y.	408 State Tower Building
TAMPA 2, FLA.	1004 Tampa Theater Building
TOLEDO 4, OHIO	1801 Ohio Building
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YORK, PA.	205 Manufacturers Building

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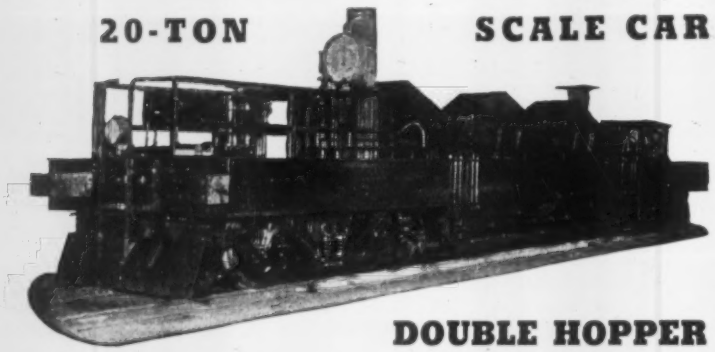
DESIGNED AND ENGINEERED FOR YOUR SPECIFIC NEEDS

20-TON SCALE CAR



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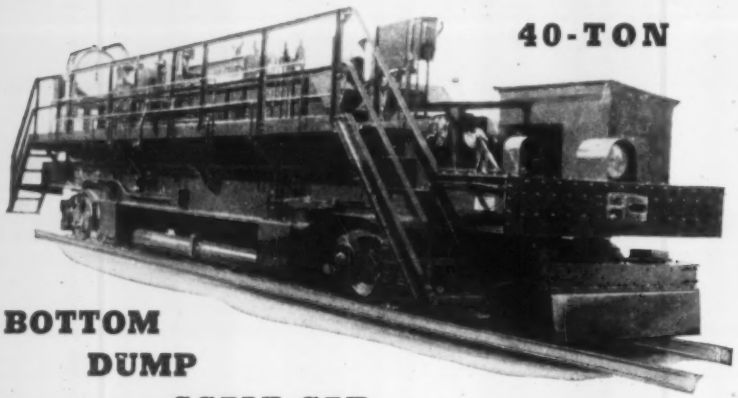
Car has Atlas underslung suspension scales with Atlas 24" scale Dial with chart recording. Air brakes and air-operated discharge gates. Cast steel side-frame trucks with Roller Bearings.

40-TON



BOTTOM DUMP SCALE CAR

Car has anti-friction bearings throughout, including axle mountings. Car has foot operated "Dead Man" control feature with air brakes inter-locked to apply automatically. Provided with ATLAS all-steel scales and 30" indicating dial. Type printing recorder attachment provides automatic weight registration at skip pit. All standard safety features provided including red marker lights and lights for illuminating the front of the bin.

Atlas Engineering Service is always at your service

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

nontechnical sections discussing related color subjects. It is available at 50 cents a copy, from the company's advertising department, 87 Union St., Salem, Mass.

Field Test Service Aids Steel Selection

WHICH of many available kinds of steel will last longest and give the best service in any particular equipment or product?

This question has been answered for many steel users by field corrosion tests performed by the research and development department of United States Steel Co. Test service is available to customers and non-customers alike.

If the steel in question is to be used for parts of operating equipment in a plant, tests are made over months or years under actual service conditions in the equipment being operated in the plant of the inquirer. If the steel is to be used to manufacture a product, similar exhaustive tests are made in the field on the steel in the product as used by the purchaser.

Field Testing Effective—This field corrosion-testing program began in the company's research and development laboratory in Pittsburgh some years ago in a limited way. At first it was confined to tests in a few different kinds of atmospheres, in fresh or sea water, or under certain prescribed conditions.

In the extended program today samples of steel may be exposed, under plant operating conditions, to any environment encountered in service. The size, shape, number of specimens and methods of exposure are varied to suit the condition under which the steel will serve. If welding or heat treatment is to be used in making the equipment or product, these treatments are given to the test samples before they are tested.

Pickles or Blast Plates—Typical of the results of the field-testing program is the case of a food manufacturer who complained of the wood barrels he used for cucumber pickles. At his request, four types of austenitic stainless steels were tested in six different pickling solutions. Examination of the exposed samples showed insignificant corrosion and no sign of pitting. This information was transmitted to the manufacturer, who has now changed over completely and successfully from wood to stainless steel barrels.

The patience and thoroughness of the research laboratory personnel are shown in tests made on blast plates for railroad bridges. Extending over

a period of seven years, the tests demonstrated that the thickness of the plates could be cut to one-third by introducing a type of steel other than that traditionally used, and that the life expectancy would be 70 years instead of an unsatisfactory ten years.

Special Sample Racks—Because corrosive conditions vary widely, the technicians who conduct corrosion tests have found it necessary to install all the steel samples for each test at the same time and in or near the same locations. To solve this problem, special racks were designed to hold specimens rigidly, yet insulate them from possible galvanic action from adjacent specimens. Rack designs are varied to fit the corrosion problem studied.

In these field corrosion tests, preweighed specimens are shipped completely assembled in test racks and installed in the equipment being studied. After a predetermined period of exposure the specimen rack is removed and returned to the laboratory, where a complete analysis is made by trained corrosion engineers.

Corrosion resistance is reported in terms of weight loss, number and depth of pits and the nature of the corrosive attack. From these data research men can determine accurately what type and grade of steel is best suited for the condition studied.

Injection Press Aims at Larger Moldings

IN anticipation of a trend to larger plastic parts made from thermoplastic materials, General Electric has installed a pre-plasticizing injection press manufactured by the Jackson & Church Co., Saginaw, Mich., at the GE molding plant in Decatur, Ill. Designed to produce plastics articles weighing up to 13 pounds, the press can be converted easily to produce much larger items. It is now in production on large refrigerator components.

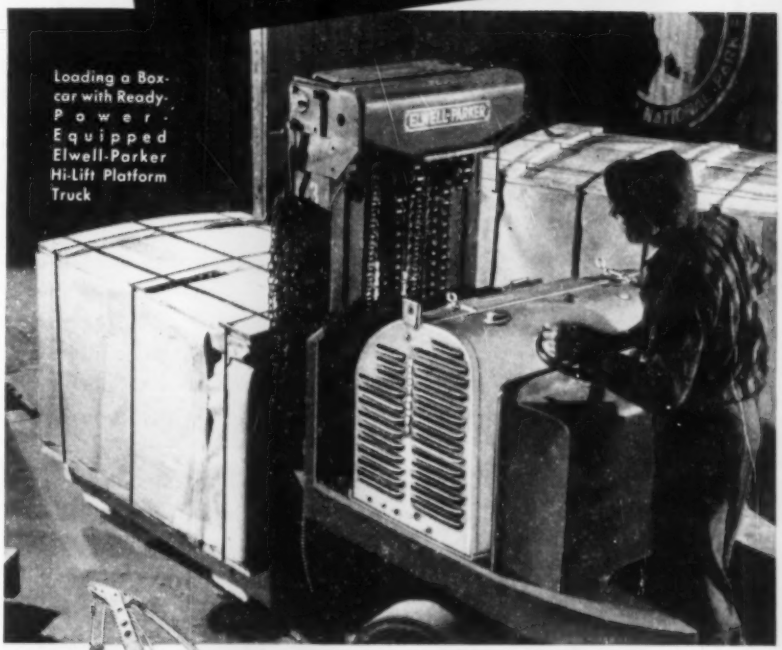
Weighing 135 tons and standing 27 ft high, the 208-ounce press incorporates a patented mechanism that gives accurate control of pressure being applied in the mold. This feature permits close control of product quality, flexibility in product design, and broadens the potentialities for large plastic moldings. Pre-plasticizing equipment on the press enables the coloring and molding of certain types of plastics in one operation. Capacity, with polystyrene, is rated at 1000 pounds per hour on a continuing basis.

The production of large thermoplastic moldings is now in the experimental stage, and the availability of plastics compounds will dic-

for CONTINUOUS ELECTRIC POWER

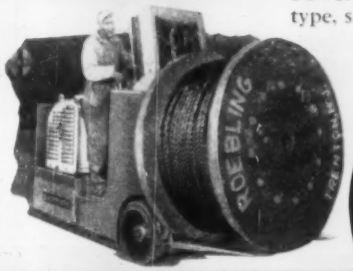
Diesel-Electric Locomotives

READY-POWER-equipped ELECTRIC-TRUCKS

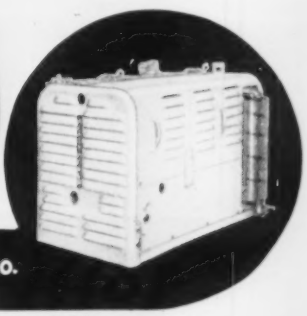


Loading a Box-car with Ready-Power-Equipped Elwell-Parker Hi-Lift Platform Truck

Yale Crane Truck Equipped with Ready Power



Ready-Power-Equipped Automatic Fork Truck



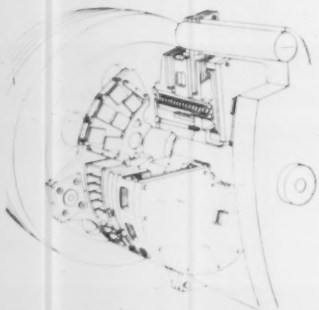
Modern Diesel-electric locomotives and Ready-Power-equipped electric trucks operate alike. Both generate dependable electric power right on the vehicle; both operate economically; and both excel where long, continuous operation pays off. Your electric trucks will do more work at less cost when equipped with Ready-Power. There are models for every type, size and make of electric truck.

THE READY-POWER CO.

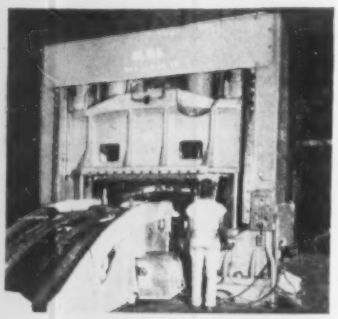
3824 Grand River Ave., Detroit 8, Michigan

NEW BLISS 4 POINT PRESS

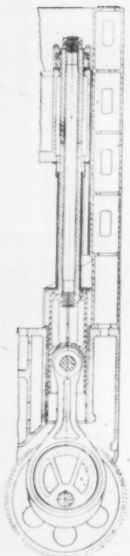
FACES THE REALISM OF MAINTENANCE



FRICTION PLATES on the Bliss single disc clutch are arranged for rapid heat dissipation. When worn, you can replace them quickly without disassembling the clutch.



3 DUPLICATES of this first installation in a leading automotive plant are now being built in Bliss plants.



UNUSUALLY LONG CONNECTIONS hold side thrust to a minimum. This drawing shows one entire side of the press.

Manufacturers using assembly-line methods to produce large stampings can save precious maintenance time with Bliss' new 4-point presses. All major assemblies—gearing, connections and clutch—are designed for faster, more convenient adjustment and part replacement.

Several hours are saved in shaft removal alone through a bearing arrangement which permits the shafts to be dropped straight down. And the clutch requires no adjustment for wear. Long-wearing friction plates can be replaced without disassembling the clutch. Extremely long slide adjustments can be made quickly through a motor-driven adjusting mechanism meshing with external threads of the sideposts. Driving gears, located beneath floor level in a pit for convenient maintenance, are protected with enclosed sideposts which prevent dirt and scrap from creeping into drive box.

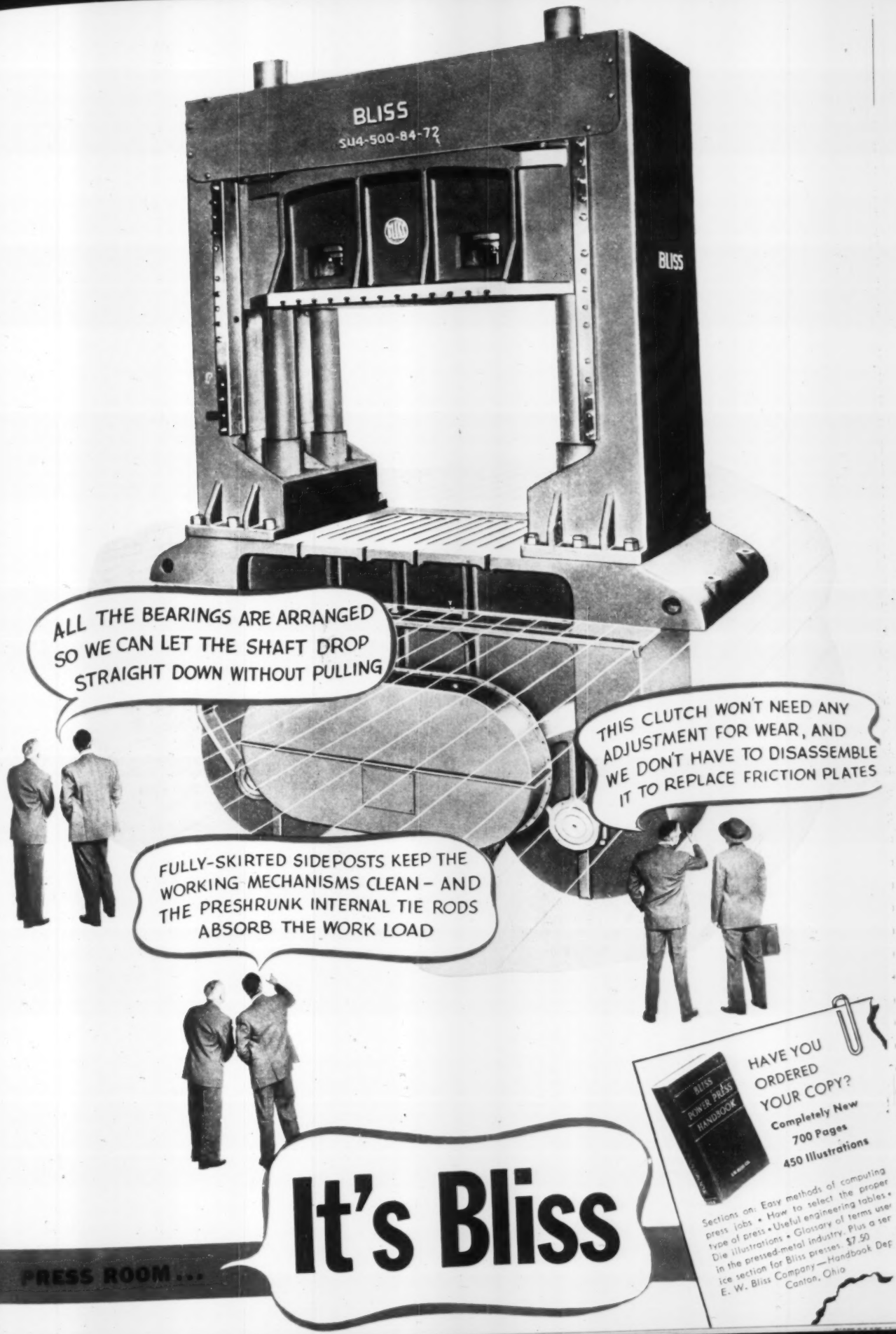
Available in sixty-three standard sizes with specifications established by the Joint Industry Conference, these Bliss presses feature an eccentric drive, unusually long connections and a rigid frame construction with full box sections and wide bases.

Whether your requirements involve one-, two- or 4-point presses, overdrive or underdrive construction, Bliss' unrivaled experience in the design and manufacture of heavy-tonnage presses is your assurance of low-cost, trouble-free service. We'll be glad to send you full details.

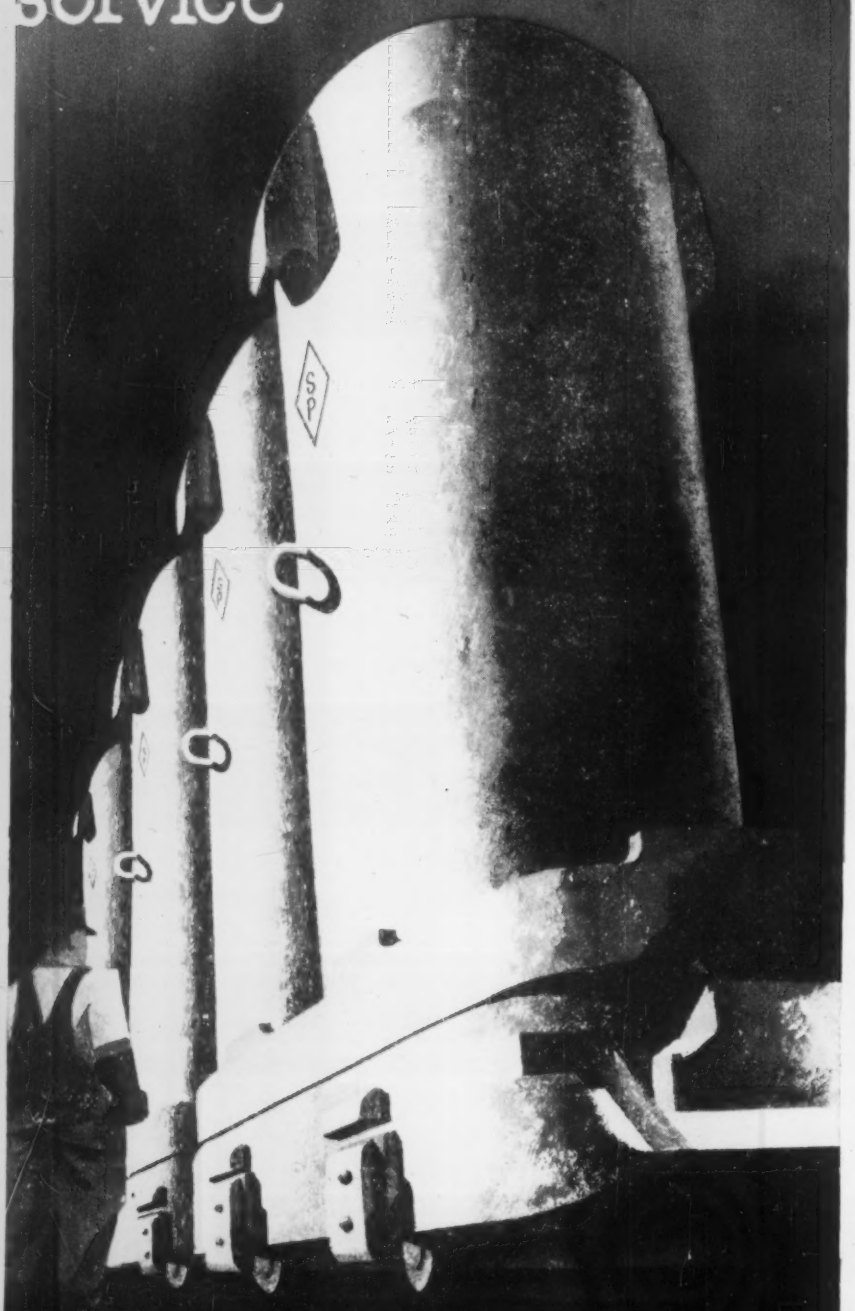
E. W. BLISS COMPANY, CANTON, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

FROM A SINGLE PRESS FOR A GIVEN JOB ... TO A COMPLETE


BLISS
SU4-500-84-72
BLISS
ALL THE BEARINGS ARE ARRANGED SO WE CAN LET THE SHAFT DROP STRAIGHT DOWN WITHOUT PULLING
THIS CLUTCH WON'T NEED ANY ADJUSTMENT FOR WEAR, AND WE DON'T HAVE TO DISASSEMBLE IT TO REPLACE FRICTION PLATES
FULLY-SKIRTED SIDEPOSTS KEEP THE WORKING MECHANISMS CLEAN – AND THE PRESHRUNK INTERNAL TIE RODS ABSORB THE WORK LOAD
PRESS ROOM...
It's Bliss
BLISS POWER PRESS HANDBOOK
HAVE YOU ORDERED YOUR COPY?
Completely New
700 Pages
450 Illustrations
Sections on: Easy methods of computing press jobs • How to select the proper type of press • Useful engineering tables • Die illustrations • Glossary of terms used in the pressed-metal industry. Plus a service section for Bliss presses. $7.50
E. W. Bliss Company—Handbook Dept.
Canton, Ohio

experience
skill
service



three priceless assets
behind every
SHENANGO·PENN MOLD
SHENANGO-PENN MOLD COMPANY OLIVER BUILDING PITTSBURGH, PENNA.

tate to a considerable degree the speed in which the larger plastics items are put into production. It is entirely conceivable that entire lighting units, air-conditioning housing, plumbing fixtures, and numerous other large items for both homes and industry will be coming off production lines in the not too distant future.

Transformers Save 25% In Critical Materials

NEW transformers, which utilize improvements in insulating materials to save 25 per cent of the copper and silicon steel normally required, and which provide improved efficiency and reduced size and weight, have been developed as a result of a joint research program by engineers of Philco Corp. and Chicago Transformer Corp.

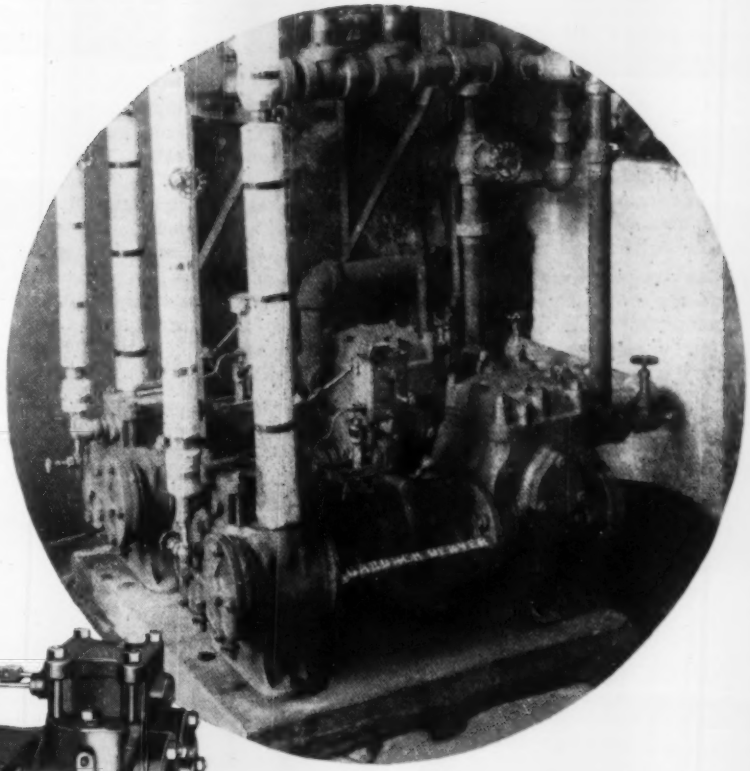
The changed transformer design will be used widely in television, radio and electronic equipment and in other fields which require electromagnetic components. In the near future savings are anticipated in the cost of various types of transformer and other electromagnetic components used in large quantities throughout the electrical industry for household, industrial and military applications.

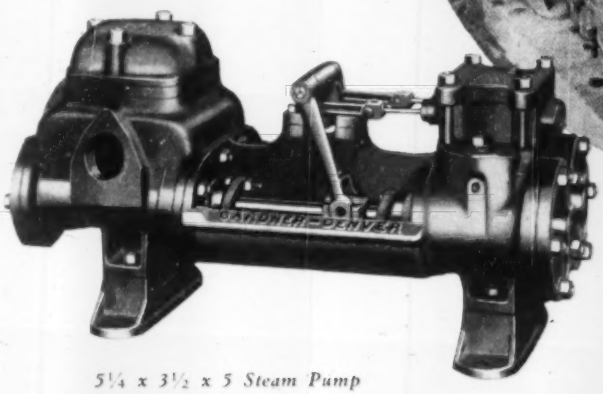
A full year of research and testing went into the selection and evaluation of the materials used in the new designs in order to prove the fundamental soundness required for long operating life. They are based on the use of high temperature nylon insulation for the magnetic wire instead of the conventional enamel, and an asbestos type of material for coil insulation instead of the conventional organic and paper insulation. These materials permit operating the coils at temperatures 25° C higher than has been permitted by the limits for conventional class A materials.

Test data were submitted to the Underwriters Laboratories for examination and approval. The laboratories have agreed to increase the maximum temperature limitations by 25° C from the 105° C (hot spot), which is the limit for class A insulation, to 130° C (hot spot) where the new materials and designs are used in equipment submitted for approval and listing.

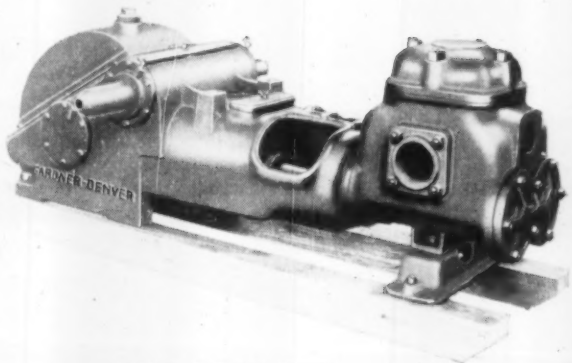
Participating in the tests in this transformer development program with Philco and Chicago Transformer were engineers of Essex Wire Co., manufacturer of the magnet wire, and E. I. du Pont de Nemours & Co., manufacturer of nylon for the high temperature wire coating.

2-Way Economy with GARDNER-DENVER Boiler Feed Pumps





5¼ x 3½ x 5 Steam Pump



3½ x 5 Power Pump

1. POWER ECONOMY! Gardner-Denver Steam Pumps have short and direct steam ports for greatest steam economy. The steam valves stay tight at all steam pressures.

Gardner-Denver Power Pumps are equipped with friction-defying Timken tapered roller main bearings. Herringbone gears and large eccentric bearings transmit more of the power into useful pumping.

2. IN THE SIZE YOU NEED! Gardner-Denver Boiler Feed Pumps are manufactured in a wide range of sizes, for any type of drive. Our pumping experts will gladly help you select just the right combination for maximum economy in your plant.

Write us today for further information.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada:
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Catalog Covers Flange Design

Available to designers and engineers having a specific interest in pressure vessel work, is a new catalog, No. 501, recently announced by Taylor Forge & Pipe Works, Chicago. The publication illustrates their line of forge nozzles, welding necks and large diameter flanges for pressure vessels, boilers and heat exchangers.

Also included are data covering standards of the Tubular Equipment Manufacturers Association and a special 43-page section devoted to modern flange design. Copies may be secured by addressing the organization at Box 485.

Bulletin Describes Tiny Switch

Bulletin describing their new Linemaster Treadlite foot switch is offered by Simonds Machine Co. Inc., Southbridge, Mass. Not much larger than a package of cigarettes, the switch is readily adapted to the control of sound and transmission equipment, relays, solenoids, magnetic switches, business machines, and any units requiring the instantaneous and accurate control of relatively low amperage loads.

DUMPS BOTH WAYS

SAVES IN ALL DIRECTIONS

Experience of users of Differential cars indicates that the saving due to the automatic unloading of 400 to 500 car loads usually is sufficient to pay for the cars. For handling waste materials, ore, or for any of many other applications, Differential Air Dump cars can do a better job for you.

Send for Bulletin D-56

Air Dump Cars · Mine Cars · Locomotives · Lorries
Car Dumpers · Complete Haulage Systems · Mantrip Cars

DIFFERENTIAL STEEL CAR CO.
FINDLAY - OHIO

Since 1915 - Pioneers in Haulage Equipment

CALENDAR OF MEETINGS

† Denotes first listing in this column.

June 15-30, Seattle International Japanese Trade Fair: Edmundson Pavilion, Seattle. Address: Port of Seattle, Box 1878, Seattle 11.

June 17-20, National Metal Trades Association: Eastern plant management conference, Mayflower Hotel, Plymouth, Mass. Association address: 122 S. Michigan Ave., Chicago 3.

June 18-22, American Society for Testing Materials: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society address: 1916 Race St., Philadelphia 3.

June 20, American Society for Testing Materials: Chemical analysis of inorganic solids by means of the mass spectrometer, Chalfonte-Haddon Hall, Atlantic City, N. J. Society address: 1916 Race St., Philadelphia 3.

June 22-23, Malleable Founders Society: Annual meeting, The Homestead, Hot Springs, Va. Society address: 1800 Union Commerce Bldg., Cleveland.

June 24-26, Alloy Castings Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute address: 32 Third Ave., Mineola, N. Y.

June 24-27, National Association of Cost Accountants: Annual international cost conference, Palmer House, Chicago. Association address: 505 Park Ave., New York 22.

June 25-29, American Institute of Electrical Engineers: General summer meeting, Royal York Hotel, Windsor, Ont. Institute address: 33 W. 39th St., New York 18.

June 25-29, American Society of Mechanical Engineers: Annual conference & exhibit, Oil and Gas Power Division, Baker Hotel, Dallas. Society address: 29 W. 39th St., New York 19.

†July 13-14, Truck-Trailer Manufacturers Association Inc.: Summer meeting, Edgewater Beach Hotel, Chicago. Association address: 1024 National Press Bldg., Washington 4.

Presses Improve Catalysts

To gain critical control of speed of catalytic reactions and to provide an improved surface-to-mass ratio, catalysts and catalyst supports now are produced in tablet form similar to the common aspirin. Improved resistance to crushing and erosion makes tablets superior for tower packing.

Tabletting presses of the F. J. Stokes Machine Co., Philadelphia, are producing 4000 tablets per minute per press at the Girdler Corp., Louisville.

Ball Bulletin Offered

A specialized service in manufacturing high-precision balls of any desired material, size and surface finish in any quantity is described in a new bulletin available from Industrial Tectonics Inc., Ann Arbor, Mich.

It lists standard and special balls available in cemented carbides, synthetic sapphire, steels, ceramics, plastics, and other workable materials, in sizes from 1/32-inch to 4 inches or larger. It shows typical tolerances, ranging as low as 0.000010-inch for carbide balls, and explains the accuracy obtainable with other materials.

New Products and Equipment

Blast Without Moving Parts

Cro-Hone pressure-blast, a self-contained wet blaster made by Cro-Plate Co. Inc., 747 Windsor St., Hartford 5, Conn., reduces maintenance and downtime by eliminating all moving parts. Basic technique of wet blasting is used to increased advantage by tripling the speed of the abrasive slurry as it is forced against the work.

In operation the work to be finished is inserted in a 30-square inch cabinet through the front handholes or side doors. Both entrances are fitted with splash-proof guards which allow neat,

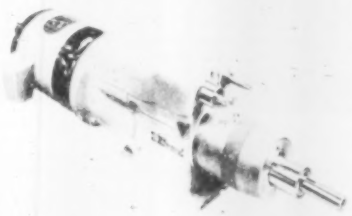
leakage-free installation. Mechanical knee actuating valves and controls are located at the front of the cabinet and a large window enables operator to watch progress of the work. Stainless steel and copper tubing is used throughout to avoid corrosion in the equipment and the work produced. Heavy-walled extruded vinyl hoses resist wear and offer maximum flexibility and ease of handling.

Check No. 1 on Reply Card for more Details

Air-Powered Drill

Heavy duty production work on drilling, reaming, tapping, chamfering, etc., can be performed with a No. 19-400 air-powered hydraulic drill unit made by Delta Power Tool Division, Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee, Wis. Unit derives its thrust from plant compressed air supply and its control from a sealed hydraulic system. Spindle is driven by an electric motor either directly through a gear train or by V-belts. It may be mounted in any position because of its sealed construction.

An adjustment for rapid approach to the work, feed and final depth are grouped at the front. Positive stops make it possible to approach the

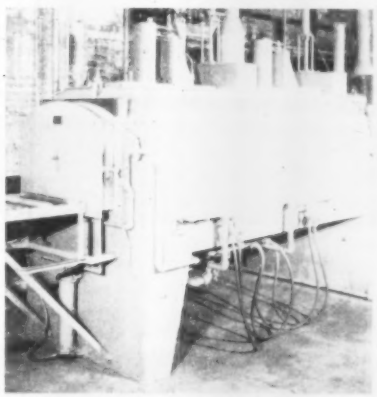


work to within 0.005-inch at 5 inches per second rapid traverse and control final depth to within 0.0005-inch. Feed is infinitely variable from zero to 50 inches per minute. At the end of the stroke the unit returns at 4 inches per second.

Check No. 2 on Reply Card for more Details

Controlled Atmosphere

Ipsen Industries Inc., 715 S. Main St., Rockford, Ill., announces a fully automatic and controlled atmosphere furnace for bright production heat treatment, rated at 600 pounds per



hour. Designated T-600, the unit is designed for bright carburizing and bright carbonitriding although straight heat treating or annealing can be performed.

It consists of two independently controlled heating zones sealed to a combination cooling chamber and quench tank. Work is automatically loaded, transferred and quenched. Furnace uses either gas or electricity and cooling chamber is water jacketed with automatic temperature control. Quench tank has built-in oil heating and cooling coils and when insulated can be used for martempering. An airdraulic operated elevator is used for quenching and the oil has 2-speed propulsion.

Check No. 3 on Reply Card for more Details

Induction Heater Improved

An improved electronic 20 kw induction heater featuring a nonventilated, dustproof NEMA type 12 enclosure is announced by General Electric Co.'s Industrial Heating Division, Schenectady 5, N. Y. It is designed so that only the control and accessories required for high-speed annealing, brazing, hardening or soldering need be purchased for any use. Totally enclosed steel cabinet is

equipped with felt-gasketed and bolted doors to protect the components from dirt, grit or oily vapors.

Two models are available, one for short-run production and the other for long-run higher production applications. Complete heater in either model weighs about 3600 pounds. Units are available for operation on 230, 460 or 550 v, three phase, 60 cycle power supply.

Check No. 4 on Reply Card for more Details

Boring Mill Design Improved

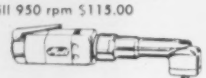
Hypro vertical boring and turning mills made by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., incorporates 10 design improvements. These include: Nonmetallic bearings for ram and saddle, independent traverse motors for rail and side heads, swivel type pendant control, helical rack and pinion on the ram, clearly marked feed controls, antifriction bearing table transmission, 16 feed gear box, table antifriction thrust

MALL TOOL KIT Saves Man Hours 6 Ways

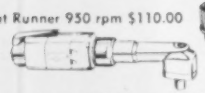
Tools Included In Kit May Be Purchased Separately At These Prices

¼" Drill 2500 rpm $80.00

½" Drill 950 rpm $115.00

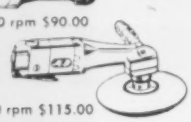


Nut Runner 950 rpm $110.00



2" dia. Grinder 18000 rpm $80.00

Sander 4800 rpm $90.00



Polisher 950 rpm $115.00

pneumatic kit meets most tool room needs

Six different tools—six ways to save man hours and work—doing many jobs with this Mall Pneumatic Tool Kit. Switch from one tool to another in a matter of seconds. One powerful, four vane, rotary type motor serves all attachments. Has built-in, automatic oiler and speed regulator. A must in plants where inflammable or explosive materials are present.

$180.00

No. 24600 Pneumatic Kit
F. O. B. CHICAGO
Complete as Shown

Mall Tool Company
7762 S. Chicago Ave., Chicago 19, Illinois

☐ Please send me free literature on the MALL PNEUMATIC TOOL KIT.

☐ I would like a free demonstration in my own plant.

Name_____

Company_____ Dept._____

Address_____

City_____ State_____

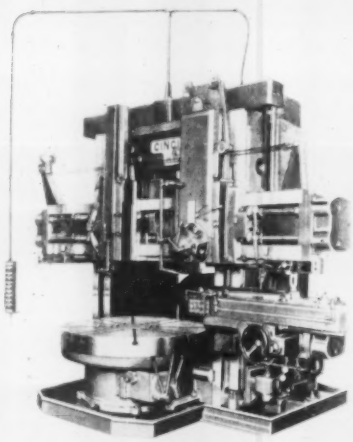
Mall® POWER TOOLS

Put POWER into MANPOWER

Manufacturers of over 1000 Tools for a Million Jobs

and load bearings, two arrangements of mechanical change gear drives and three electrical arrangements for single shift drives.

Independent traverse motor insures positive power to various machine heads. Complicated driveshafts and transmission units have been eliminated. Helical rack and pinion improves feed movements when threading or drum scoring. Fine adjustment is possible by means of hand cranks



on 54 and 64-inch machines and through sliding fine adjustment handles on feed shafts and rail screws on larger machines. Feed box provides 16 feeds from 0.003 to 0.500-inch on 54 and 64-inch machines and feeds from 0.004 to 0.750-inch on 6-foot or larger machines. In the 16-gear change main drive table speed variation is obtained through 16 mechanical gear changes.

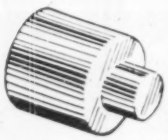
Check No. 5 on Reply Card for more Details

Aircraft Job Handled

Ekstrom, Carlson & Co., 1400 Railroad Ave., Rockford, Ill., is offering its Nos. V-84 and V-109 radial arm Routerdrils for working in nonferrous metals, plastics, or plywood. Five combinations are available in each

model: Type D-2 fitted with one router head and one drill head, type R-2 employing two router heads, type D-2 equipped with two drill heads, type R-1 with one router head and type D-1 furnished with one drill head. No. V-109 with a radial reach of 109 inches will cover all points of two 4 x 12-foot work tables (set

LONGER TOOL LIFE



BETTER, *MORE UNIFORM* FINISH

FASTER PRODUCTION

-are yours

when you use

WYCKOFF

COLD FINISHED STEEL

CARBON AND ALLOY

WYCKOFF STEEL COMPANY

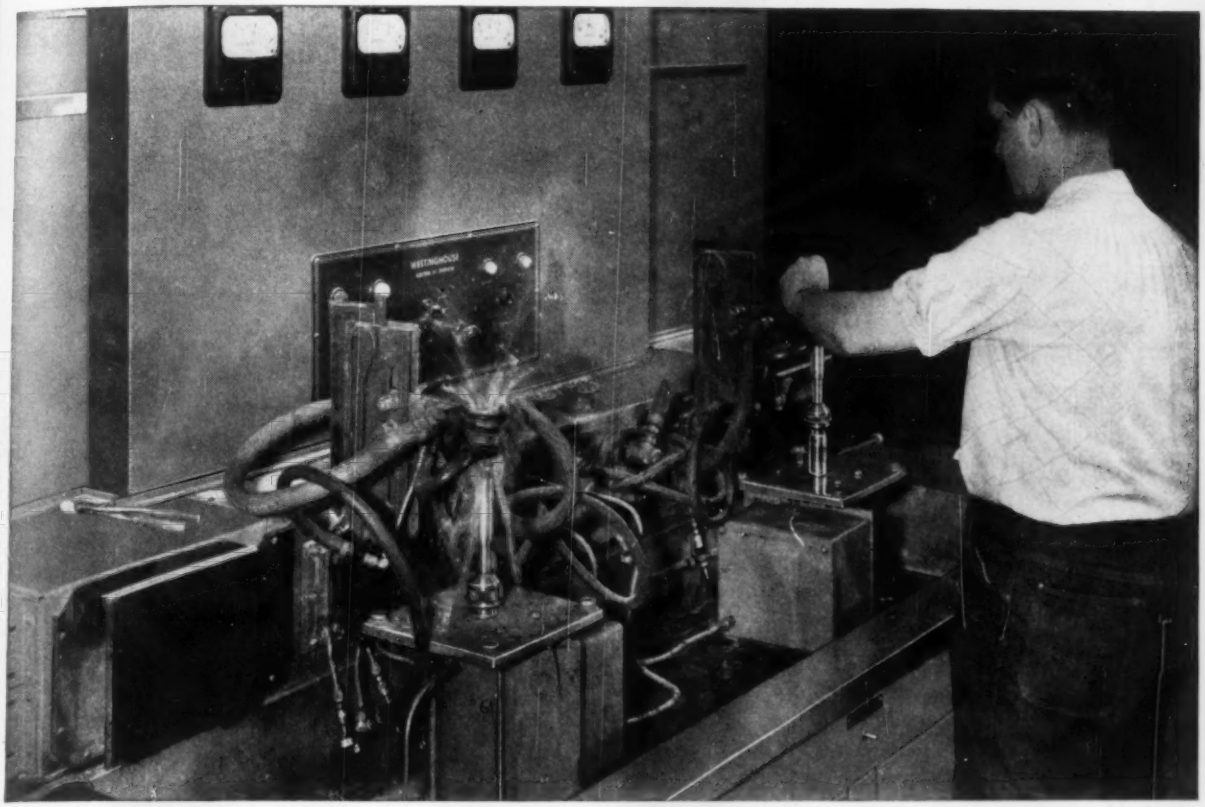
FIRST NATIONAL BANK BUILDING
PITTSBURGH 30, PA.

3200 S. KEDZIE AVENUE
CHICAGO 23, ILLINOIS

Works at: Ambridge, Pa. · Chicago, Illinois
Newark, N.J. · Putnam, Conn.

YOU CAN BE **SURE**... IF IT'S

Westinghouse



NOTHING TALKS TOUGHER...

PRODUCTION UP 226%; COSTS DOWN 60%!

Could you use production increases of 226% with direct costs lowered 60% in your quantity hardening? That's the mean average for five typical parts as reported by The Massey-Harris Company, Racine, Wisconsin, farm equipment manufacturers. Now sixty different parts, formerly carburized, are hardened by two Westinghouse 50 KW-450 KC RF generators with standard Westinghouse rotating-lifting spindles.

Such results are usual with Westinghouse RF equipment, and—added savings are realized with in-line production techniques, negligible ready time, production increases without plant expansion, and elimination of descaling, straightening and other operations.

Such flexibility and productivity pay high dividends. Examine Westinghouse RF heating possibilities NOW—they may solve your heat treating problems.

We'll be glad to help you increase *your* quantity hardening production and decrease *your* costs. Our engineering representatives will gladly consult with your staff (without obligation, of course); their experience has aided many manufacturers. Write today. Address: Westinghouse Electric Corporation, Department S-1, 2519 Wilkens Ave., Baltimore 3, Maryland.

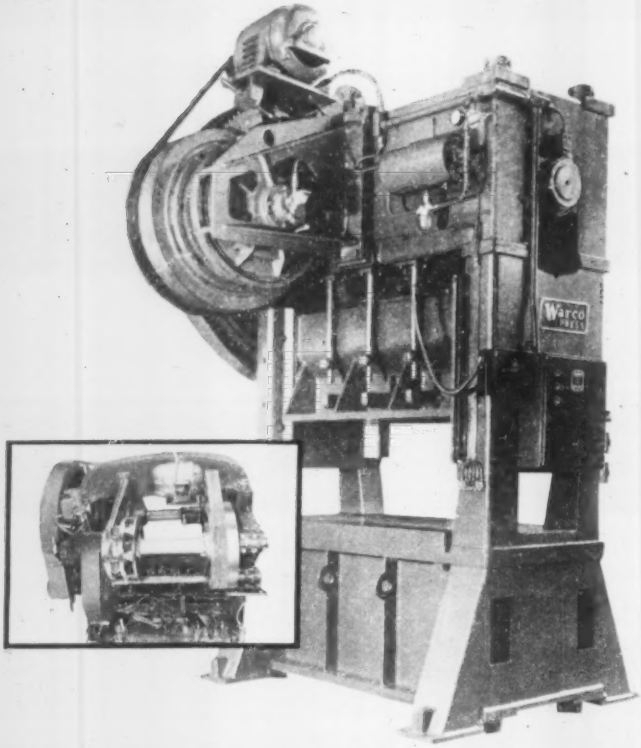
J-92225

Westinghouse

RF HEATING

Warco PRESSES ®

Pneumatic Clutch and Brake Minimizes Common Press Failure



The new **Warco** Pneumatic Clutch and Brake is not just another air clutch. It is efficient, safe, easy to maintain. Here is a partial list of **Warco** advantages:

- Carefully balanced strength-weight ratio requires less motor horsepower, consequently a decrease in power consumption; also allows clutch to run cooler, delivering longer trouble-free service.
- Mechanically interlocked clutch and brake plates eliminate all possibility of overlap between clutch and brake.
- Clutch is air actuated — brake is spring actuated. In the event of failure of air supply brake will be safely engaged.
- Piston rings are used in air cylinder of clutch, eliminating packing deterioration from heat.
- "O" rings are employed as static seals to eliminate air leaks.
- Full clutch torque possible at only 60 psi air . . . line pressure over this acts as a reserve in case of emergency.

The Warco Pneumatic Clutch and Brake is made in both single and multiple plate models, to meet the requirements of each individual press. It can be applied to presses in the field regardless of make. Write for additional data.

Federal ® WELDERS

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Warco PRESSES ®

up 180 degrees apart, one on each side of the machine) upon which work stacked in sheets up to a ¾-inch total thickness may be routed or drilled simultaneously. No. V-84 with a radial reach of 84 inches will take care of work within the dimensions of a 4 x 6-foot table. All models have a full 360 degree swing around the turret mounting post.

The 5-hp router head spindle rotates at a speed of 15,000 rpm while the dual-speed drill head motor delivers spindle speeds of 7500 and 15,000 rpm at 1 hp and ½-hp, respectively. Smooth cutting and vibrationless operation results from using high frequency motors that are statically and dynamically balanced.

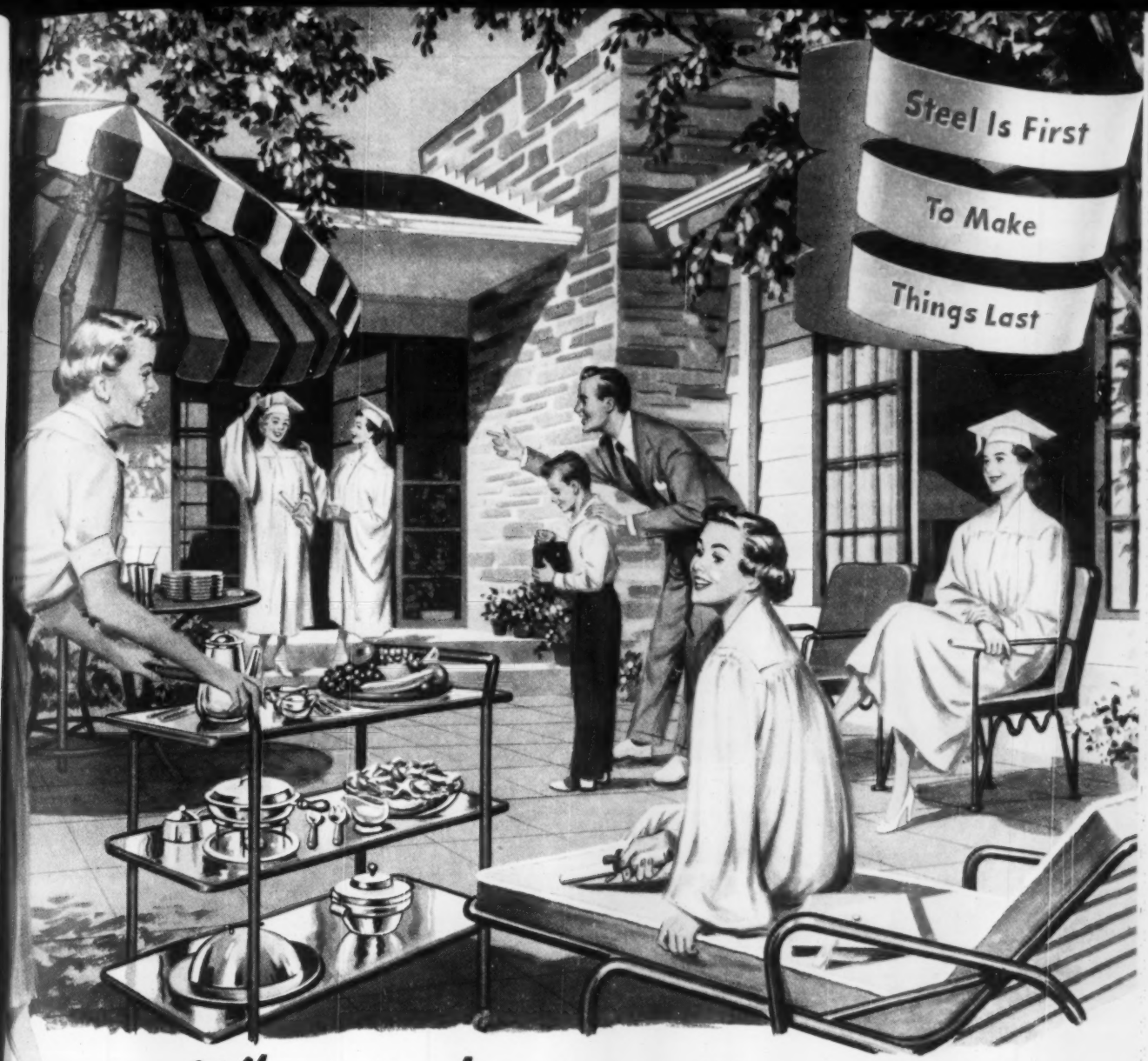
Check No. 6 on Reply Card for more Details

Diesel Powered Lifter

An industrial fork lift truck powered by a diesel engine and equipped with a hydraulic transmission is a development of Philadelphia Division, Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. The

truck is specifically designed for applications where fire hazards exist, where there is a limited amount of fresh air and in outdoor areas where continuous heavy-duty operation is a necessity.

Power is supplied by a Hercules six cylinder diesel engine with a continuous rating of 70 hp. A double impeller fluid coupling lengthens clutch life and reduces wear and tear on other truck parts. Power plant of the truck also features hypoid gearing of the type usually found in over-the-road highway carriers. Hydraulic brakes prevent load shifting and damage. Truck has a 72-inch wheelbase



When steel puts on its party manners

Metal sculpture, executed in Weirzin—electrolytic zinc-coated steel that resists heat, moisture, rust—demonstrates the exceptional workability of this easily fabricated metal.

You don't have to own a country estate to enjoy the fun of parties, steak fries and barbecues right on the home grounds.

With a little imagination—and the right furnishings—any smart couple can transform the area outside their home into an attractively functional site for outdoor living.

And the right furnishings are available and agreeably priced. They are made of steel—America's great bargain metal.

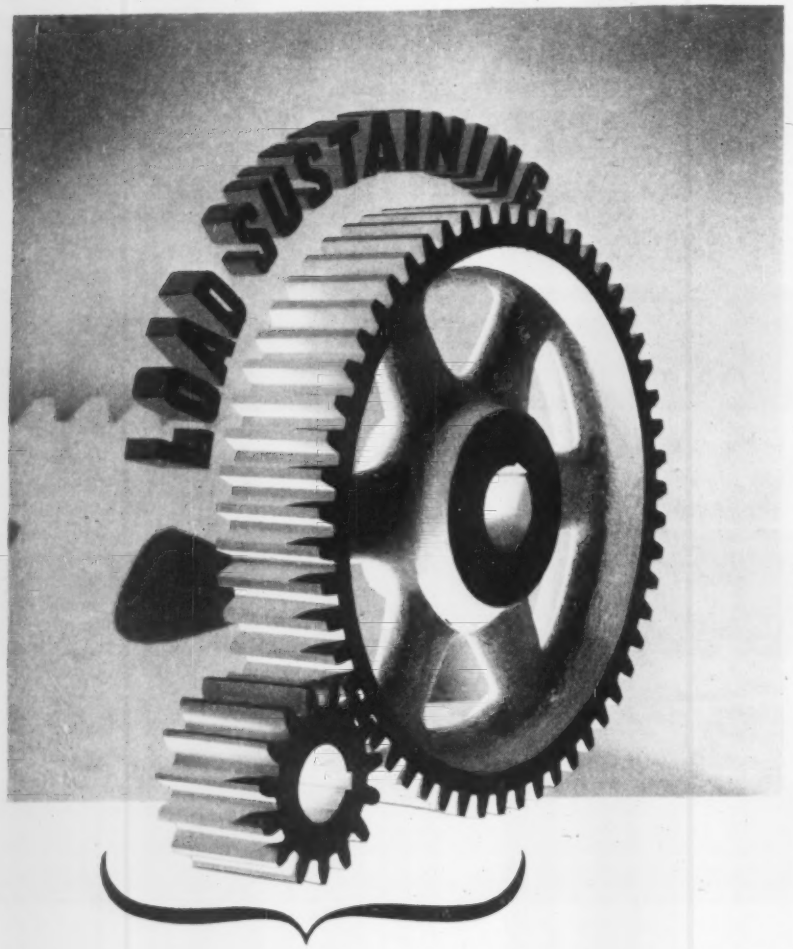
Steel outdoor furnishings are handsome as well as hardy. They resist corrosion, rot, fire and warping better than any other paintable material. You know they'll last through years of hard use, years of hard weather.

Steel costs so little . . . gives so much. Make steel your standard—and save.

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION



H & S gears are

EXTRA HEAVY FOR THE PITCH

• Built of the finest materials by skilled craftsmen, Horsburgh & Scott gears are accurate and husky. "Steel muscled" for hard work... rims, arms and hubs are extra heavy for the pitch. Outside diameter, faces and ends of hubs are smooth finished to the correct size. Pitch line is absolutely concentric with the bore. Teeth are accurately cut with the correct amount of backlash for smooth operation. Bores and keyseats are accurately and smoothly finished. They are built to stand the "gaff".

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

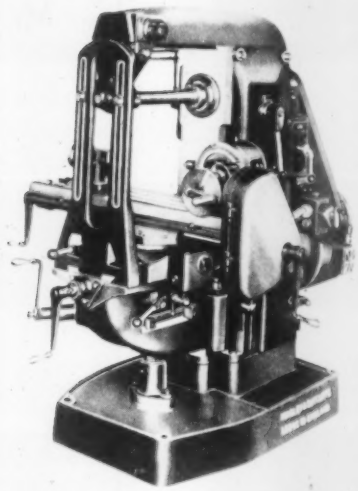
Send note on Company Letterhead for 488-Page Catalog 49

and length of fork face is 113½ inches. The 9600-pound truck has a top speed of 13 mph.

Check No. 7 on Reply Card for more Details

Precision Milling

Milling machine manufactured by Midgley & Sutcliffe Ltd., England, is available through British Industries Corp., International Machinery Division, 164 Duane St., New York 13, N. Y. It is guaranteed within



limits of 0.001-inch in 12 inches. Drive is from a 3-hp four speed motor to American standards.

Fast and slow ranges of speed are provided by back gearing, thus a total of eight speeds ranging from 44 to 800 rpm are obtained. Table, middle slide and knee are of substantial proportions with precision ground bearing surfaces. Spindle and gearing is made of high grade alloy steel and hardened at the spindle nose mounted in phosphor bronze bearings, the front one being externally tapered and adjustable. Thrust is taken in both directions by phosphor bronze washers. Automatic feed is provided to the table and cross traverses in either direction. Six rates of feed for each spindle speed are obtained through a three speed feed box.

Check No. 8 on Reply Card for more Details

Speed Reducer Lines

Type DB double reduction speed reducers in ratings from 1 to 100 hp are available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. They are designed for applications on small to medium size drives where the prime mover is coupled or belted to the gear unit.

Reducers use all external type helical gearing, arranged in a horizontal plane. When coupled to an

electric motor a straight line drive results. Eight unit sizes are available, 12 standard gear ratios range from 6.25 to 58.3:1. Other features include: Accurately hobbed single helical gearing, taper hardened by the Westinghouse BPT process; split construction cast iron case for accessibility; simple, positive splash lubrication system; antifriction bearings; and efficiencies averaging 96 per cent.

Check No. 9 on Reply Card for more Details

Mobile Lifter

Hopto truck crane made by Badger Machine Co., Winona, Minn., may be mounted on any standard automotive truck 1½ tons or larger. Power is supplied by a hydraulically operated

power takeoff or independent motor. It is a completely hydraulic hoist, boom and swing.

Weight of the crane is 2200 pounds net and it has a 180 degree swing. Capacity is 1500 pounds on a 15-foot radius. Greater capacities are possible with stabilizers. Maximum lifting height is 23 feet.

Check No. 10 on Reply Card for more Details

Materials Handling Pumps

A line of air-operated material handling pumps is announced by the Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill. They are designed for use with spray or flow guns including those used for fine finishing work. Pump handles thinners, enamels, lacquers, adhesives, sound deadeners and protective coatings. Operating directly from shipping containers the pumps save handling time and increase production.

Type A pumps clamp to the rim of open 55-gallon drums, type B pumps are designed for use in the 2-inch bungholes of 55-gallon drums and

GET YOUR COPY NOW!

—of "Standard's" UNBRAKO *Standards.*
Write on your business letterhead, today.

SOCKET UNBRAKO SCREWS

"Standard" recommends *Standards*

SPS STANDARD PRESSED STEEL CO.
JENKINTOWN 33, PENNSYLVANIA

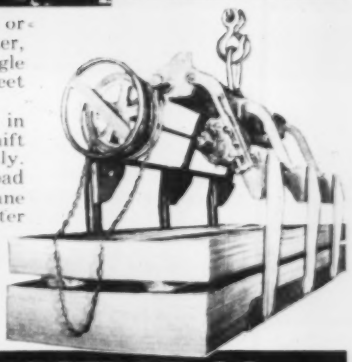
Wide *or* Narrow...

1 C-F LIFTER HANDLES THEM ALL

Whether your production requires a few or many widths of sheet steel, 1 C-F Lifter, with its wide range of jaw and carrying angle adjustments will probably meet all your sheet handling requirements.

Adjustments are made by the operator in a few seconds, permitting the Lifter to shift from wide to narrow sizes almost instantly.

Because it can pick up, carry and unload more loads per hour, using less man and crane time than any other method, a C-F Lifter will soon pay for itself.



Bulletin SL-25 gives you the complete story of C-F Lifter advantages to you. Ask for it today. There's no obligation.

CULLEN-FRIESTEDT CO.
1308 South Kilbourn Avenue • Chicago 23, Illinois

HALLDEN
Automatic Shears

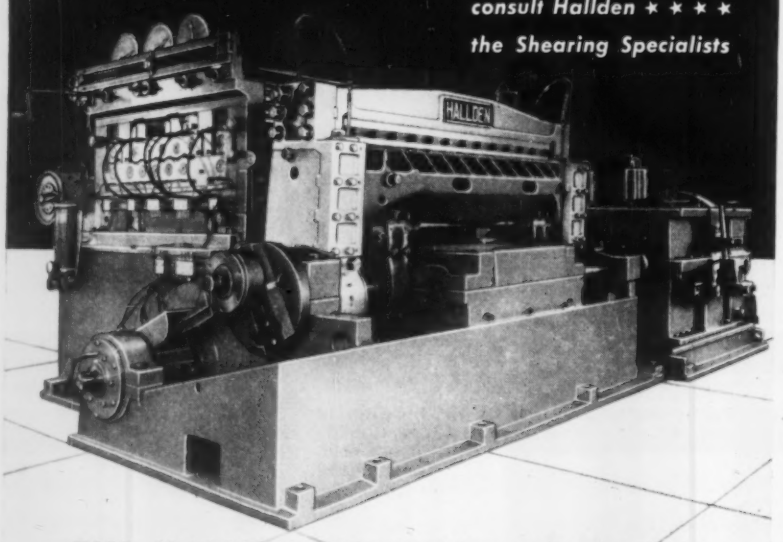
★ FLEXIBLE DESIGN

★ CUTTING ACCURACY

★ CONTINUOUS FEED

★ RUGGED CONSTRUCTION

consult Hallden ★ ★ ★ ★
the Shearing Specialists



THE HALLDEN MACHINE COMPANY
THOMASTON, CONNECTICUT

Sales Representatives
The Wean Engineering Co., Inc., Warren, O. T. E. Dodds, Pittsburgh, Pa.
W. H. A. Robertson & Co., Ltd., Bedford, England

type BS pumps fit 5-gallon containers. Material is pumped on both the downstroke and the upstroke of these reciprocating, positive-action pumps giving a smooth fast flow of materials. They are available in five pressure ratios ranging from 1:1 for handling light materials to 10:1 for heavy semifluid materials or those which must be pumped through long hoses or pipe lines.

Check No. 11 on Reply Card for more Details

Fast Working Nibbler

Desirable features of the German-made Pels with certain engineering improvements are incorporated in the Worcester nibbler made by Arduini Mfg. Corp., 435 Shrewsbury St., Worcester 4, Mass. Features of the machine are two-speed drive and variable stroke adjustment to accommodate different thicknesses of metal.

Straight or contour cutting is accomplished at the rate of 1200 punch strokes per minute. Perfect circles may be cut rapidly and accurately and clean edges reduce finishing operations to a minimum, with no distortion of material. Machine is made in two sizes: One to handle up to 3/16-inch low carbon steel, the other up to 5/16-inch.

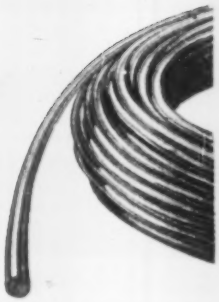
Check No. 12 on Reply Card for more Details

Industrial Cleaner Improved

An improved motor and driveshaft as well as aluminum splash pans under each of the three glass jars feature the industrial precision cleaning machine made by L & R Mfg. Co., 577 Elm St., Arlington, N. J. The 10 to 1 ratio ball bearing gear reduction motor is now made in the company's plant. It is a universal series wound motor, rheostat controlled and may be reversed for effective cleaning by means of a toggle switch. Widely spaced bearings help to keep

"Formbrite"

GOOD NEWS for those who use Cold Heading Wire



THIS MAY BE THE FIRST TIME you've heard of "Formbrite." But to those who fabricated the millions of pounds we've produced in the past year, Formbrite represents a long forward stride in the metallurgical development of Cold Heading Wire.

The name "Formbrite" designates a special process of rolling or drawing, plus a special heat treatment which imparts a superfine grain to copper-base metal. At present Formbrite is produced only in certain brass alloys.

The advantages? Formbrite Cold Heading Wire is bright, clean, strong and "springy"—yet possesses a degree of workable ductility unlike any wire you've seen of equal strength and hardness. That's what makes it so desirable for rivets, wood screws, machine screws and a host of other cold upset products.

Where parts are to be polished or plated, fine-grained Formbrite offers definite money-saving advantages on buffing, polishing and tumbling operations. Moreover, Formbrite Cold Heading Wire is supplied in *one* temper, resulting in simplified stocks and inventory.

Formbrite is produced in the form of sheet, strip, rod, wire and seamless tube—at no increase in price. For deep-drawn polished or plated parts, it's been nothing short of sensational. Want to compare Formbrite with ordinary drawing brass in your own polishing room? Then write for a kit of two sample cups—plus additional information about Formbrite. Address The American Brass Company, General Offices, Waterbury 20, Connecticut. S1100

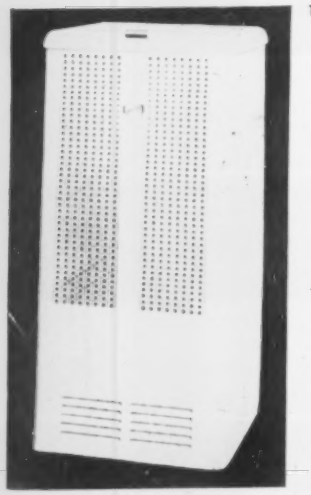
Formbrite is a trade mark of The American Brass Company designating copper-base alloys of exceptionally fine grain, combining unusual polishing characteristics with strength and hardness, plus excellent ductility.

the name to remember in

COPPER·BRASS·BRONZE

Hendrick Ornametal

TRADE MARK



Hendrick Ornametal is a decorative, lightweight metal grille suitable for a wide variety of applications, such as for stove panels as shown in the illustration.

Furnished in a wide variety of attractive designs, Ornametal is made of a special bright finish, cold rolled steel, suitable for painting or plating, and is available in a wide range of stock size sheets and gauges. Write for full information.

1876—Seventy-Fifth Anniversary—1951

SEE OUR CATALOG IN SWEET'S

HENDRICK

Manufacturing Company

30 DUNDAFF STREET, CARBONDALE, PENNA.

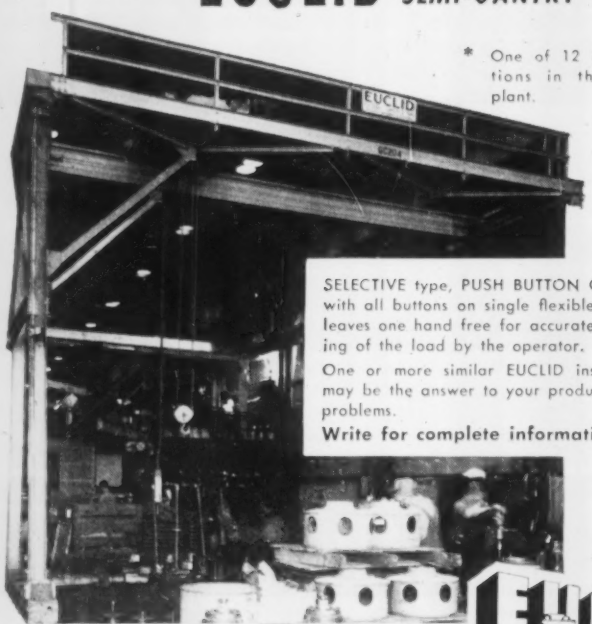
Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids

ASSEMBLY LINE "SPEED UP" ACCOMPLISHED

WITH THE AID OF THE **EUCLID** 3 TON *SEMI-GANTRY* CRANE*

* One of 12 installations in the same plant.



SELECTIVE type, PUSH BUTTON CONTROL with all buttons on single flexible pendant leaves one hand free for accurate positioning of the load by the operator.

One or more similar EUCLID installations may be the answer to your production line problems.

Write for complete information.

THE EUCLID CRANE & HOIST COMPANY
1364 CHARDON ROAD, EUCLID, OHIO

EUCLID CRANES AND HOISTS
Raise Profits

the work basket concentric. They are enclosed in a double sealed cartridge to prevent the solution from entering the motor cage.

Aluminum splash pans under each glass jar prevent possible spilling over of the solutions from the containers to affect the wiring in the base of the machine. Machine is 23

inches high, 16½ inches wide and 17¼ inches long. Monel mesh work basket measures 5½ ID by 3⅜ inches deep into which triple nesting baskets fit to segregate small parts. Glass jars are a gallon and a half in capacity. Chromalox heater unit and a separate motor driven blower in the drying chamber assure drying of the parts cleaned.

Check No. 13 on Reply Card for more Details

Liquid-Tight Fittings

To connect synthetic-covered flexible metallic conduit, Vap-Oil Tite is offered by Simplet Electric Co., Chicago 51, Ill. It is a liquid and vapor tight, positive ground fitting that is recommended where water, oil, chemicals, grease, dirt, corrosive fumes, etc., are present or where small movements and hard to get at places are factors. Fitting is available in sizes from 3/8 to 2 inches.

Check No. 14 on Reply Card for more Details

Wide Speed Range Tachometer

A three range, single head, fixed installation tachometer indicator for speed measuring applications where a particularly wide range of speed measurement is desired is available from Metron Instrument Co., Denver 9, Colo. Scales are supplied for direct reading in any units such as rpm, fpm, inches/second, or in any

Samuel Colt's Patent Revolver of 1836

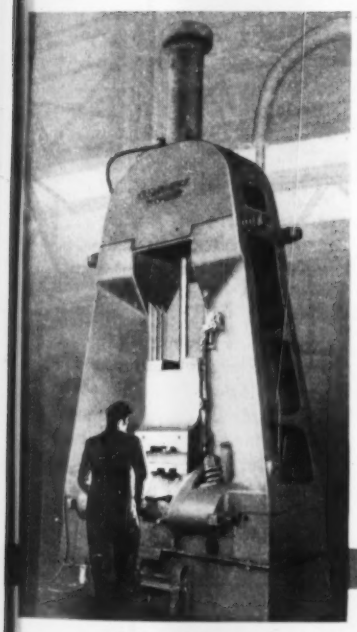
was **Forged**-

so is the Colt Automatic of 1951

(Right) Colt Commander Model .45 Caliber

(Left) Aluminum Alloy Drop Forging for Colt Commander

PHOTOS COURTESY COLT'S MFG. CO. AND DROP FORGING ASSOC.



WHEN Samuel Colt invented the revolver in 1836, he realized that any mechanism subjected to the shock of continuous firing must be made of forged steel...for only hammering—impact—could impart to metal the strength and toughness to withstand continued shock and stress.

In the great rearmament program now going on, the modern descendant of Samuel Colt's great invention—the automatic pistol—and thousands of other types of weapons rely on forgings to give them the resistance to shock, strain and stress that means superior fire power.

Forgings come first!

Although patented in 1836, Colt's revolver didn't get into real production until 1847 when the enterprising Eli Whitney turned out 1000 at his plant at Whitneyville, Conn. The new weapon was an immediate success in the Indian wars. One of the first record set by the new revolver was when 15 Texas Rangers armed with revolvers defeated 80 Comanche Indians, killing 4[illegible] of them.

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa.

CHAMBERSBURG

THE HAMMER BUILDERS

quantity which is proportional to the speed actuating head.

Check No. 15 on Reply Card for more Details

Round Handled Type Holder

A hand type holder with round, knurled handle is being offered for general industrial stamping by M. E. Cunningham Co., Pittsburgh, Pa. It is the same as the company's Wedge-Grip hand type holder except for shape of the handle. Design includes a patented quick change snap slide for changing type inserts and retaining type pin in the holder.

Check No. 16 on Reply Card for more Details

Carbide Insert Tools Redesigned

Firth Sterling Steel & Carbide Corp., McKeesport, Pa., announces a complete redesign of their carbide insert Mechanigript tools. They feature open facing of the carbide insert so that chips curl against the carbide and top or bottom screw adjustment of the carbide insert.

Check No. 17 on Reply Card for more Details

Pendant Control Station

Bulletin 800T pendant pushbutton station, made by Allen-Bradley Co., Milwaukee, Wis., is designed for use as a portable control or for suspension above a machine where it may be easily reached while operator is near his work. These oil-tight stations may be obtained in sizes having three units including the stop, to 10 units, including the stop.

Check No. 18 on Reply Card for more Details

Hermetically Sealed Relays

Type Em-7 hermetically sealed mercury contact plunger relays, introduced by Ebert Electronics Co., Long Island, N. Y., are three-pole type employing one coil. Tungsten contacts are hermetically sealed in hydrogen-filled glass tubes. Relays can be supplied with all three contacts either normally open or normally closed, or with any combination of normally open or normally closed contacts.

Check No. 19 on Reply Card for more Details

Flow Control Valve

For controlling flow of bulk materials from bins, hoppers and chutes in weighing, blending and packing operations, Syntron Co., Homer City, Pa., introduces a flow control valve. It has a flexible diaphragm so that rotating the control lever increases or decreases the opening of the diaphragm and flow of material.

Check No. 20 on Reply Card for more Details

Graphite Ground Anode

Size 3 x 60 inches graphite ground anode is introduced by National Carbon Co., division of Union Carbide & Carbon Corp., New York 17, N. Y. It is said to provide longer life as there are more pounds of graphite per unit of exposed surface. Anodes are provided complete with 36-inch long insulated No. 8 weatherproof cable.

Check No. 21 on Reply Card for more Details

Remote Control System

A new hydraulic remote control system is available from Superdraulic Corp., Detroit 4, Mich. It consists of a master unit and a slave unit interconnected by two small tubes. Motion applied to the actuating lever of the master unit is accurately duplicated by the slave unit lever.

Check No. 22 on Reply Card for more Details

Damping Valve Prevents Shock

To eliminate excessive shock in high pressure hydraulic systems, Denison Engineering Co., Columbus, O., has developed new surge damping valves. They are individual units universally adaptable to any hydraulic circuit. Valve adjusts itself automatically to any working pressure, requires only a fraction of a second to act and cannot slow down cycle time.

Check No. 23 on Reply Card for more Details

Live Centers

Royal Products, Mineola, N. Y., offers a new line of Regent live centers that have a small, free turning point and provide good rigidity due to the stabilizing bearing located in the shank. The shorter overhang eliminates chatter. The tool is accurate to 0.001-inch.

Check No. 24 on Reply Card for more Details

Pistol Grip Screwdriver

Known as the ED series, new pistol grip screwdrivers have been added to the Thor line by Independent Pneumatic Tool Co., Aurora, Ill. They are available in 13 attachment and speed variations for driving up to No. 12 screws and for setting nuts up to ¼-inch thread.

Check No. 25 on Reply Card for more Details

Center Finder

L. S. Starrett Co., Athol, Mass., has developed a center finder with additional points and attachments that make it widely adaptable to precision work. Attachments are clamped in a shank by a ball swivel joint which permits adjustment to true concentricity or to any angular position. With the sharp point, working centers for jig and tool work or for vertical or milling machines can be quickly located.

Check No. 26 on Reply Card for more Details

Removes Tramp Iron

Eriez Mfg. Co., Erie, Pa., is installing new ATOMagnets in all gravity flow hump assemblies. These magnetic separators are installed on opposite faces of the hump so they can set up a magnetic barrier in tandem.

Check No. 27 on Reply Card for more Details

Safety Relief Valve Assemblies

Assemblies consisting of two or three series 33 safety relief valves have been developed by McDonnell & Miller Inc., Chicago 18, Ill., for adequately safeguarding large hot water heating boilers from excessive pressure. They give a discharge capacity equal to the sum of the capacities of the two or three valves.

Check No. 28 on Reply Card for more Details

Pneumatic Die Grinder

Mall Tool Co., Chicago 19, Ill., offers a new pneumatic die grinder that is 4⅝ inches long, 1¼ inches wide and weighs 12 ounces. A choice of lever or button-type throttles with a special collet guard allows the operator to hold tool close to work. Eight sizes of Erickson precision collets are available to give a complete range of shanks from $\frac{1}{64}$-inch to ¼-inch. Rotary vane type air motor is cool running and develops 26,000 rpm.

Check No. 29 on Reply Card for more Details

Retaining Nut Is Self-Locking

Designed to act as a self-locking nut on threaded shafts, a Truarc series 5300 triangular shaped retaining nut is announced by Waldes Kohinoor Inc., Long Island 1, N. Y. It has a drawn helical segment with a tapered inner edge that forms a single thread conforming with American standards. When screwed on a threaded shaft, the body flattens under torque and secures an equal load distribution against part being held.

Check No. 30 on Reply Card for more Details

FOR MORE INFORMATION

on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

75. Motor Service

A. O. Smith Corp., Product Service Div.—4-page illustrated flyer shows location of all A. O. Smith authorized motor service stations in country. Over 200 stations, four Product Service branches and two electric motor factories are listed.

76. Roller Bearings

Shafer Bearing Corp.—56-page illustrated catalog No. 51 describes full line including pillow blocks, flange and flange cartridge units, duplex units, take-up units, take-up and frame units and unmounted roller bearings. Engineering and load rating data and applications are given for ConCaVex design bearings.

77. Locknuts

Townsend Co.—Tufflok and Nylok locknuts which use fiber washer and nylon insert, respectively, as locking mediums are described in 4-page illustrated folder TL-63. These cold-forged locknuts are listed according to sizes and finishes and are especially usable in aircraft and industrial applications.

78. Industrial Truck Operation

Clark Equipment Co., Industrial Truck Div.—"Safety Saves!" is title of 24-page illustrated booklet which outlines simple, practical code for safe industrial truck operation. Cartoons emphasize "do's and don'ts" for operators of fork-lift trucks and industrial towing tractors.

79. Bearing Maintenance

Anti-Friction Bearing Distributors Association—20-page illustrated booklet "Installation—Maintenance—Removal of Anti-Friction Bearings" is guide to servicing, selection and application of ball, roller and needle bearings. "Bearing Maintenance Report" is regularly issued publication which deals with all phases of this subject. Included is file folder to simplify collection of bearing reference data.

80. Nameplates, Dials & Panels

Ateenate, Inc.—Sample and illustrations of typical nameplate, dials or panels produced by Ateenate process which permanently marks stainless steel are included in 4-page bulletin. Jet black markings can be reproduced in any desired pattern, either positive or reversed, on practically any size of stainless steel.

81. Elevating Table

Hamilton Tool Co.—4-page illustrated bulletin No. P-50 presents general information and specifications for Portelvator portable elevating table. Special equipment, such as guard rails and roller conveyor top, and special designs are described.

82. Bulk Containers

Youngstown Steel Door Co.—4-page illustrated folder "There Are Savings To Be Made with Youngstown Containers" gives specifications of drop bottom and controlled discharge container for bulk materials. Both have capacities of 145 cu ft.

83. Film Catalog

Westinghouse Electric Corp. — Seventy-two sound films on general interest subjects, production information and training and instruction courses are listed in 1951 catalog B-4761. Page of descriptive text with illustrations is provided for each film, along with ordering information.

84. Springs & Wire Parts

Cuyahoga Spring Co.—20-page illustrated catalog No. 49 is devoted to information on coil springs and wire parts. Table of standard wire gages, spring data, extension and compression springs, available types of ends and torsion springs are covered. Also described are round and flat wire forms and assemblies made to user's specifications as well as fastenings and wire handles.

85. Lacquer

Hercules Powder Co., Cellulose Products Dept.—8-page manual "The Case for Lacquer in Military Procurement" discusses advantages of cellulose lacquers over other finishes, with particular emphasis on its availability. Other points mentioned are speed and ease of use, high production, controllable reflectance and adequate service life. Uses of lacquer as protective coating are covered.

86. Instrumentation

Weston Electrical Instrument Corp. — 12-page illustrated pocket-size booklet "It's All Done with Instruments" reviews many modern achievements which depend on various types of electrical testing, measuring and control instruments for their successful operation.

87. Tool Holders

Scully-Jones & Co.—4-page illustrated bulletin 7-50 and 2-page price list contains full information on plain drill, Use-Em-Up and milling machine sleeves; extension and square hole sockets; and short, sleeve and extension types of turret tool holders.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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88. Hose Clamps & Fittings

Punch-Lok Co.—12-page illustrated catalog No. 300 shows and explains Punch-Lok method and its many applications and lists standard hose clamps, locking tools and special fittings. Clamps can be used also for other banding and clamping applications such as splicing electric cable, repairing leaks in pipe lines and mending split crossarms.

89. Pneumatic Rivet Passer

Pennsylvania Flexible Metallic Tubing Co.—Illustrated folder describes how savings in time and labor can be realized by Penflex pneumatic rivet passer which deliver hot rivets at high speeds to riveters over 150 ft away. Interlocked metal hose transmits rivets and acts as continuous tumbling barrel, delivering them free from scale.

90. Boring & Turning Machines

American Steel Foundries, King Machine Tool Div.—Illustrated catalog K-1 describes and presents specifications of 30, 36 and 42-in. vertical boring and turning machines. Catalog K-2 covers 52, 62 and 72-in. machines; catalog K-3, sizes 84 and 100 in.; and catalog K-4, 120 and 144 in.

91. Gas & Oil Burners

Bloom Engineering Co.—Small capacity Long Flame gas, oil and combination burners are described in 16-page illustrated bulletin 1220. Operating principle, dimensions and application data are given on various types and sizes.

92. Roll-Formed Shapes

Roll Formed Products Co.—8-page illustrated bulletin "Roll-Formed Shapes" gives details of tees, tubes, angles, channels, moldings, zee sections and special shapes rolled from stainless or carbon steels, zinc, brass, copper and aluminum. Production facilities; notching, forming and punching operations; and typical applications are covered.

93. In-Plant Feeding

Hotpoint Inc.—72-page illustrated catalog of "Commercial Electric Cooking and Baking Equipment" deals with Glamour and Custom-Made Counter lines of broilers, fry kettles, griddles, ovens, ranges, food warmers and other electric equipment designed specifically for industrial plant cafeteria and kitchen use. Modern equipment is suited especially for mass in-plant feeding in defense plants.

94. Electric Motors

Wagner Electric Corp.—4-page illustrated brochure details operating characteristics and specifications of various types of single phase, polyphase and squirrel-cage motors for industrial applications.

95. Water Treatment

Brooks Chemicals, Inc.—16-page illustrated booklet No. 501 gives technical data and describes various services, products and methods employed in solving many water problems encountered in industry, institutions and governmental works.

96. Starting Switch

Allen-Bradley Co.—8-page illustrated catalog features bulletin 600 manual starting switches for fractional horsepower motors of either alternating or direct current type. Among the six switches shown is key operated model for both open and closed types, useful where unauthorized operation of switch is to be prevented. Enclosed model for hazardous locations are also listed.

97. Spray Nozzles

Yarnall-Waring Co.—20-page illustrated bulletin N-617 presents information on spray nozzles for water cooling, air conditioning and general industrial usage. Included is data on involute nozzles for spray cooling ponds as well as small involute and flat-spray nozzles for industrial processes.

98. Metallograph

Bausch & Lomb Optical Co.—20-page illustrated catalog E-232 is descriptive of the Balphot metallograph which permits speedy determination of the crystalline structure, composition, grain size and nonmetallic inclusion contents of metals you make and metals you buy. Operating principle and applications of this instrument are covered.

99. Retaining Rings

Waldes Kohinoor, Inc.—Details of Truarc retaining rings for radial assembly are tabulated in 8-page illustrated bulletin 7. These external type rings are applied radially without pliers. They position machine parts on shafts, especially where groove is inaccessible in axial direction. Engineering data are given on "e", crescent and interlocking types.

100. Materials Handling

Whiting Corp.—16-page illustrated brochure "Quick Facts on Handling" presents four-step approach to job of improved handling efficiency using company's line of handling equipment. Products featured include Trackmobile, Trambeam overhead handling systems, electric chain hoists, overhead and economy type cranes and company facilities and engineering.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
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The Market Outlook

INCREASINGLY critical scrap shortage is shaping up, threatening continuance of the present above-capacity steel production pace. Not only is volume disappointing, but quality of material often is not up to standard. While tonnage is moving steadily into consumption from scrap yards and other sources, the flow is insufficient to permit replenishment of shrinking mill inventories, which, in some cases, are lowest in years. Normal inventory is considered 60-90 days. Some producers' stocks are down to 6 days.

ALLOCATIONS—Growing number of steelmakers depend on government allocations to sustain their production schedules. And indications are more directives on the scrap yards will be forthcoming soon with collections falling short of expectations as industrial volume slips in step with declining civilian durable goods manufacture. Up to now the bulk of allocations has been of railroad material. So far in the emergency only scattered furnace suspensions for lack of scrap have been necessary.

PRODUCTION—Steel continues to pour from the nation's furnaces in near-record volume in the face of raw material shortages and scattered labor disturbances. In May, a record 9,094,000 net tons were produced, topping the previous high monthly output mark set in March this year by 23,000 tons. Production in the first five months this year at 43,614,444 net tons was largest ever chalked up for the period and was nearly 4.6 million tons more than were produced in the like 1950 period. Indications are vacation curtailments will be minor this summer with output limited only to the extent of raw material scarcity and suspensions for repairs.

OPERATIONS—Last week steelmaking boomed along at 103 per cent of capacity. This was equivalent to production of about 2,060,000 net tons, and represented a gain of some 130,000 tons over output in the like week a year ago.

DISTRIBUTION—Mounting uncertainty is evident in the steel markets as switch to Controlled Materials Plan distribution nears. Considerable administrative detail remains to be worked out before the effective date, July 1. Mills are busy lining up production schedules for defense and related account for third quarter and are still uncertain what "free" tonnage will be available for the general consuming market. In some of the major products supply will fall far short of demands despite mandatory cutbacks in production of civilian durable goods. Extension of CMP allocation of metals to all manufacturing industry, including consumer durable goods, now looms as a distinct possibility beginning fourth quarter. Meanwhile, government control authorities continue to issue new regulations covering specific items, such as the latest NPA order increasing the amounts of iron and steel castings which producers must reserve on their boards for third quarter consumption in defense and related essential lines.

DEMAND—Government control authorities are under pressure from all consuming directions for forward supply coverage into fourth quarter and beyond. In a number of cases spot steel supply assistance prior to the effective date of CMP is sought. Pending further advices from the government the steelmakers generally are restricting further fourth quarter acceptances of DO orders to military and Atomic Energy Commission account, these being the only accounts so far authorized to revalidate defense ratings with CMP allotment numbers or to use CMP allotment numbers in new orders.

PRICES—Office of Price Stabilization has under consideration pricing policy proposals for the various steel and related products. Suggestions at industry committee meetings are being studied and expectations are some changes from the existing price freeze may be effected over coming months. Meanwhile, prices are firm at the January levels, STEEL's weighted index on finished steel holding at 171.92 and the arithmetical composite at $106.32.

NATIONAL STEELWORKS OPERATIONS

DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended June 16	Change	Same Week 1950	Same Week 1949
Pittsburgh	102	—2	101.5	82.5
Chicago	105.5	—0.5	102.5	96.5
Mid-Atlantic	101	0	98	83
Youngstown	105	0	106	89
Wheeling	98.5	0	106.5	69
Cleveland	100.5	—0.5	101.5	91.5
Buffalo	104	0	104	94
Birmingham	100	0	100	100
New England	85	—4	85	58
Cincinnati	104	—2	104	97
St. Louis	95	—4.5	91	66.5
Detroit	108	—5	109	101
Western	105.5	0	93	83
Estimated national rate	103	0	101	86.5

Based on weekly steelmaking capacity of 1,999,634 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

* Change from revised rate for preceding week.

Composite Market Averages

	June 14 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av. = 100)	171.92	171.92	171.92	156.58	111.86
Index in cents per lb.	4.657	4.657	4.657	4.242	3.030
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$94.32	$64.45
No. 2 Fdry. Pig Iron, GT	52.54	52.54	52.54	46.47	26.17
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	25.50
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.79
Steelmaking Scrap, GT	44.00	44.00	44.00	39.33	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	June 14 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bars, H.R., del. Philadelphia	4.20	4.20	4.20	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10-15	3.10
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia	3.91	3.91	3.91	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.50
Sheets, H.R., Pittsburgh	3.60-75	3.60-75	3.60-75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh	3.75-4.00	3.75-4.00	3.75-4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.35-5.60	4.35-5.60	4.35-5.60	4.35-40	3.15
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.50	3.03
Nails, Wire, Pittsburgh	5.90-6.20	5.90-6.20	5.90-6.20	5.30	3.25
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$", Pitts.	4.10-30	4.10-30	4.10-30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$27.00
Basic Valley	52.00	52.00	52.00	46.00	26.00
Basic del. Phila.	56.49	56.49	56.49	49.44	27.84
No. 2 Fdry. Pitts.	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry. Chicago	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry. Valley	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry. Del. Phila.	56.99	56.99	56.99	49.94	28.34
No. 2 Fdry. Birm.	48.88	48.88	48.88	42.38	22.88
No. 2 Fdry. (Birm.)del. Cin.	55.33	55.33	55.33	48.08	26.94
Malleable Valley	52.50	52.50	52.50	46.50	26.50
Malleable, Chicago	52.50	52.50	52.50	46.50	26.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt. Pitts.	$45.00	$45.00	$45.00	$45.00	$20.00
No. 1 Heavy Melt. E. Pa.	43.50	43.50	43.50	35.50	18.75
No. 1 Heavy Melt. Chicago	43.50	43.50	43.50	37.50	18.75
No. 1 Heavy Melt. Valley	45.00	45.00	45.00	43.75	20.00
No. 1 Heavy Melt. Cleve.	44.00	44.00	44.00	41.75	19.50
No. 1 Heavy Melt. Buffalo	44.00	44.00	44.00	39.75	19.25
Rails, Rerolling, Chicago	52.50	52.50	52.50	49.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	47.00	20.00

* F. o.b. shipping point.

COKE, Net Ton

Beehive, Furn. Connlsvl.	$14.75	$14.75	$14.75	$14.25	$7.50
Beehive, Fdry., Connlsvl.	17.50	17.50	17.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	22.50	14.375
Zinc, E. St. Louis	17.50	17.50	17.50	14.50	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	8.10
Tin, New York	123.00	136.00	139.00	77.50	52.00
Aluminum, del.	19.00	19.00	19.00	17.50	15.00
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid	56.50	56.50	50.50	48.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.69	59.46	....
Newark,del.	56.74	57.24	57.74	58.24
Philadelphia,del.	56.49	56.99	57.49	57.99
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.33	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y. W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y. T9	....	52.50	53.00	....
Boston,del.	61.63	62.13	62.63	....
Rochester,N.Y.,del.	54.74	55.24	55.74	....
Syracuse,N.Y.,del.	55.72	56.22	56.72	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill. Y1	52.00	52.50	52.50	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	53.97	54.47	54.47	54.97
Muskegon,Mich.,del.	....	58.20	58.20	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.49	54.99	54.99	55.49
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	51.75	52.25	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.35	....	....
Portland,Oreg.,del.	....	60.35	....	....
LosAngeles,SanFrancisco,del.	59.85	60.35	....	....
GraniteCity,Ill. G4	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.66	55.16	55.66	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N.&S. sides, Ambridge, Aliquippa,del.	....	53.74	53.74	54.24
McKeesRocks, del.	....	53.49	53.49	53.99
Lawrenceville, Homestead, McKeesport,Monaca,del.	....	54.00	54.00	54.50
Verona,del.	....	54.48	54.48	54.98
Brackenridge,del.	....	54.72	54.72	55.22
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monnessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.21	57.71	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield,O.,del.	56.43	56.93	56.93	57.43

*Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50%, no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.73

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83.00
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	93.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 x 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.12
Troy,N.Y. R2	60.00

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Semifinished and Finished Steel Products

All prices quoted under GCPR as reported to STEEL, June 14, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ... $59.00
Mc Keesport,Pa. U5 ... 52.00

INGOTS, Alloy (NT)
Detroit R7 ... $54.00
Fontana,Calif. K1 ... 80.00
Houston,Tex. S5 ... 62.00
Midland,Pa. C18 ... 54.00
Massillon,O. R5 ... 54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ... $56.00
Buffalo R2 ... 56.00
Canton,O. R2 ... 56.00
Clairton,Pa. U5 ... 56.00
Cleveland R2 ... 56.00
Conshohocken,Pa. A3 ... 56.00
Detroit R7 ... 56.00
Ensley,Ala. T2 ... 56.00
Fairfield,Ala. T2 ... 56.00
Fontana,Calif. K1 ... 75.00
Gary,Ind. U5 ... 56.00
Johnstown,Pa. B2 ... 56.00
Lackawanna,N.Y. B2 ... 56.00
Munhall,Pa. U5 ... 56.00
So.Chicago,Ill. U5 ... 56.00
So.Duquesne,Pa. U5 ... 56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ... $66.00
Buffalo R2 ... 66.00
Canton,O. R2 ... 66.00
Clairton,Pa. U5 ... 66.00
Cleveland R2 ... 66.00
Conshohocken,Pa. A3 ... 73.00
Detroit R7 ... 69.00
Ensley,Ala. T2 ... 66.00
Fairfield,Ala. T2 ... 66.00
Fontana,Calif. K1 ... 85.00
Gary,Ind. U5 ... 66.00
Geneva,Utah G1 ... 66.00
Houston,Tex. S5 ... 74.00
Johnstown,Pa. B2 ... 66.00
Lackawanna,N.Y. B2 ... 66.00
LosAngeles B3 ... 85.00
Munhall,Pa. U5 ... 66.00
Seattle B3 ... 85.00
So.Chicago R2,U5,W14 ... 66.00
So.Duquesne,Pa. U5 ... 66.00
So.SanFrancisco B3 ... 85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ... $70.00
Buffalo R2 ... 70.00
Canton,O. R2 ... 70.00
Canton,O. (29) T7 ... 66.00
Conshohocken,Pa. A3 ... 77.00
Detroit R7 ... 73.00
Fontana,Calif. K1 ... 89.00
Gary,Ind. U5 ... 70.00
Houston,Tex. S5 ... 78.00
Ind.Harbor,Ind. Y1 ... 70.00
Johnstown,Pa. B2 ... 70.00
Lackawanna,N.Y. B2 ... 70.00
LosAngeles B3 ... 90.00
Massillon,O. R2 ... 70.00
Midland,Pa. C18 ... 70.00
Munhall,Pa. U5 ... 70.00
So.Chicago R2,U5,W14 ... 70.00
So.Duquesne,Pa. U5 ... 70.00
Struthers,O. Y1 ... 70.00
Warren,O. C17 ... 70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ... $82.00
Cleveland R2 ... 82.00
Fontana,Calif. K1 ... 103.00
Gary,Ind. U5 ... 82.00
Massillon,O. R2 ... 82.00
So.Chicago,Ill. R2 ... 82.00
So.Duquesne,Pa. U5 ... 82.00

SHEET BARS (NT)
Fontana,Calif. K1 ... $89.00

SKELP
Aliquippa,Pa. J5 ... 3.45
Munhall,Pa. U5 ... 3.35
Warren,O. R2 ... 3.35
Youngstown R2, U5 ... 3.35

WIRE RODS
AlabamaCity,Ala. R2 ... 4.10
Buffalo W12 ... 4.10
Cleveland A7 ... 4.10
Donora,Pa. A7 ... 4.10
Fairfield,Ala. T2 ... 4.10
Fontana,Calif. K1 ... 4.90
Houston,Tex. S5 ... 4.50
Johnstown,Pa. B2 ... 4.10
Joliet,Ill. A7 ... 4.10
LosAngeles B3 ... 4.90
Minnequa,Colo. C10 ... 4.35
Monessen,Pa. P7 ... 4.30
No.Tonawanda,N.Y.B11 ... 4.10
Pittsburg,Calif. C11 ... 4.75
Portsmouth,O. P12 ... 4.30
Roebling,N.J. R5 ... 4.20
So.Chicago,Ill. R2 ... 4.10
SparrowsPoint,Md. B2 ... 4.20
Sterling,Ill.(1) N15 ... 4.10
Struthers,O. Y1 ... 4.10
Torrance,Calif. C11 ... 4.90
Worcester A7 ... 4.40

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.45
Lackawanna,N.Y. B2 ... 4.45
Munhall,Pa. U5 ... 4.45
So.Chicago,Ill. U5 ... 4.45

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ... 3.60
Aliquippa,Pa. J5 ... 3.65
Bessemer,Ala. T2 ... 3.65
Bethlehem,Pa. B2 ... 3.70
Clairton,Pa. U5 ... 3.65
Fairfield,Ala. T2 ... 3.65
Fontana,Calif. K1 ... 4.25
Gary,Ind. U5 ... 3.65
Geneva,Utah G1 ... 3.65
Houston,Tex. S5 ... 4.05
Ind.Harbor,Ind. I-2 ... 3.65
Johnstown,Pa. B2 ... 3.70
KansasCity,Mo. S5 ... 4.25
Lackawanna,N.Y. B2 ... 3.70
LosAngeles B3 ... 4.25
Minnequa,Colo. C10 ... 4.10
Munhall,Pa. U5 ... 3.65
Niles,Calif.(22) P1 ... 4.85
Phoenixville,Pa. P4 ... 4.95
Portland,Oreg. O4 ... 4.50
Seattle B3 ... 4.30
So.Chicago,Ill. U5, W14 ... 3.65
So.SanFrancisco B3 ... 4.20
Torrance,Calif. C11 ... 4.25
Weirton,W.Va. W6 ... 3.90

Alloy Stand. Shapes
Clairton,Pa. U5 ... 4.35
Fontana,Calif. K1 ... 5.55
Munhall,Pa. U5 ... 4.35
So.Chicago,Ill. U5 ... 4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 ... 5.50
Bessemer,Ala. T2 ... 5.50
Bethlehem,Pa.(14) B2 ... 5.50
Clairton,Pa. U5 ... 5.50
Fairfield,Ala. T2 ... 5.50
Fontana,Calif. K1 ... 6.10
Gary,Ind. U5 ... 5.50
Geneva,Utah G1 ... 5.50
Ind.Harbor,Ind. I-2 ... 5.50
Ind.Harbor,Ind. Y1 ... 6.00
Johnstown,Pa. B2 ... 5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 ... 6.05
Munhall,Pa. U5 ... 5.50
Seattle B3 ... 6.10
So.Chicago,Ill. U5 ... 5.50
So.SanFrancisco B3 ... 6.00
Struthers,O. Y1 ... 6.00

Wide Flange
Bethlehem,Pa. B2 ... 3.70
Clairton,Pa. U5 ... 3.65
Fontana,Calif. K1 ... 4.65
Lackawanna,N.Y. B2 ... 3.70
Munhall,Pa. U5 ... 3.65
So.Chicago,Ill. U5 ... 3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ... 5.50
Lackawanna,N.Y. B2 ... 5.50
Munhall,Pa. U5 ... 5.45
So. Chicago,Ill. U5 ... 5.45

BEARING PILES
Munhall,Pa. U5 ... 3.65
So.Chicago,Ill. U5 ... 3.65

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ... 5.65
Bessemer,Ala. T2 ... 5.65
Clairton,Pa. U5 ... 5.65
Cleveland J5, R2 ... 5.65
Conshohocken,Pa. A3 ... 5.90
Fairfield,Ala. T2 ... 5.65
Fontana,Calif.(30) K1 ... 6.25
Gary,Ind. U5 ... 5.65
Geneva,Utah G1 ... 5.65
Ind.Harbor,Ind. I-2 ... 5.65
Ind.Harbor,Ind. Y1 ... 6.15
Johnstown,Pa. B2 ... 5.65
Munhall,Pa. U5 ... 5.65
Pittsburgh J5 ... 5.65
Seattle B3 ... 6.55
Sharon,Pa. S3 ... 5.70
So.Chicago,Ill. U5 ... 5.65
SparrowsPoint,Md. B2 ... 5.65
Warren,O. R2 ... 5.65
Youngstown Y1 ... 6.15

PLATES, Open-Hearth Alloy
Claymont, Del. C22 ... 4.85
Coatesville,Pa. L7 ... 5.25
Conshohocken,Pa. A3 ... 5.05
Fontana,Calif. K1 ... 5.70
Gary, Ind. U5 ... 4.75
Johnstown,Pa. B2 ... 4.75
Munhall,Pa. U5 ... 4.75
Sharon,Pa. S3 ... 5.20
So.Chicago,Ill. U5 ... 4.75
SparrowsPoint,Md. B2 ... 4.75

FLOOR PLATES
Cleveland J5 ... 4.75
Conshohocken,Pa. A3 ... 4.75
Harrisburg,Pa. C5 ... 5.95
Ind.Harbor,Ind. I-2 ... 4.75
Munhall,Pa. U5 ... 4.75
So.Chicago,Ill. U5 ... 4.75

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ... 3.95
Ashland,lcl(15) A10 ... 4.45
Cleveland,c.l. R2 ... 4.30
Warren,O.c.l. R2 ... 4.30

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ... 3.70
Aliquippa,Pa. J5 ... 3.70
Ashland,Ky.(15) A10 ... 3.70
Bessemer,Ala. T2 ... 3.70
Clairton,Pa. U5 ... 3.70
Claymont,Del. C22 ... 4.15
Cleveland J5, R2 ... 3.70
Coatesville,Pa. L7 ... 4.15
Conshohocken,Pa. A3 ... 4.15
Fairfield,Ala. T2 ... 3.70
Fontana,Calif.(30) K1 ... 4.30
Gary,Ind. U5 ... 3.70
GraniteCity,Ill. G4 ... 4.40
Geneva,Utah G1 ... 3.70
Harrisburg,Pa. C5 ... 4.95
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.70
Johnstown,Pa. B2 ... 3.70
Lackawanna,N.Y. B2 ... 3.70
Minnequa,Colo. C10 ... 4.50
Munhall,Pa. U5 ... 3.70
Pittsburgh J5 ... 3.70
Seattle B3 ... 4.60
Sharon,Pa. S3 ... 3.95
So.Chicago,Ill. U5, W14 ... 3.70
SparrowsPoint,Md. B2 ... 3.70
Steubenville,O. W10 ... 3.70
Warren,O. R2 ... 3.70
Weirton,W.Va. W6 ... 4.00
Youngstown R2, U5, Y1 ... 3.70

PLATES, Carbon A. R.
Fontana,Calif. K1 ... 5.45
Geneva,Utah G1 ... 4.85

PLATES, Wrought Iron
Economy,Pa. B14 ... 8.60

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ... 3.70
Aliquippa,Pa. J5 ... 3.70
Alton,Ill.(4) L1 ... 3.95
Atlanta,Ga. A11 ... 4.25
Bessemer,Ala. T2 ... 3.70
Buffalo R2 ... 3.70
Canton,O. R2 ... 3.70
Clairton,Pa. U5 ... 3.70
Cleveland R2 ... 3.70
Detroit R7 ... 3.85
Emeryville,Calif. J7 ... 4.45
Fairfield,Ala. T2 ... 3.70
Fontana,Calif. K1 ... 4.40
Gary,Ind. U5 ... 3.70
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.70
Johnstown,Pa. B2 ... 3.70
KansasCity,Mo. S5 ... 4.30
Lackawanna,N.Y. B2 ... 3.70
LosAngeles B3 ... 4.40
Milton,Pa. B6 ... 4.20
Minnequa,Colo. C10 ... 4.15
Niles,Calif. P1 ... 5.05
N.Tonawanda,N.Y. B11 ... 3.70
Pittsburg,Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland,Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So.Chicago R2, U5, W14 ... 3.70
So.Duquesne,Pa. U5 ... 3.70
So.SanFran.,Cal. B3 ... 4.45
Struthers,O. Y1 ... 3.70
Torrance,Calif. C11 ... 4.40
Weirton,W.Va. W6 ... 3.85
Youngstown R2, U5 ... 3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ... 3.70
Atlanta A11 ... 4.25
Johnstown,Pa. B2 ... 3.70
Lackawanna,N.Y. B2 ... 3.70
Niles,Calif. P1 ... 5.05
Portland,Oreg. O4 ... 4.65
SanFrancisco S7 ... 4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem,Pa. B2 ... 3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ... 4.30
Buffalo R2 ... 4.30
Canton,O. R2 ... 4.30
Canton,O.(29) T7 ... 3.95
Clairton,Pa. U5 ... 4.30
Detroit R7 ... 4.45
Ecorse,Mich. G5 ... 4.65
Fontana,Calif. K1 ... 5.35
Gary,Ind. U5 ... 4.30
Houston,Tex. S5 ... 4.70
Ind.Harbor,Ind. I-2, Y1 ... 4.30
Johnstown,Pa. B2 ... 4.30
KansasCity,Mo. S5 ... 4.90
Lackawanna,N.Y. B2 ... 4.30
LosAngeles B3 ... 5.35
Massillon,O. R2 ... 4.30
Midland,Pa. C18 ... 4.30
So.Chicago R2,U5,W14 ... 4.30
So.Duquesne,Pa. U5 ... 4.30
Struthers,O. Y1 ... 4.30
Warren,O. C17 ... 4.30
Youngstown U5 ... 4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 ... 4.55
Gary,Ind. U5 ... 4.55
Youngstown U5 ... 4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ... 5.55
Bessemer,Ala. T2 ... 5.55
Bethlehem,Pa. B2 ... 5.55
Clairton,Pa. U5 ... 5.55
Cleveland R2 ... 5.55
Fairfield,Ala. T2 ... 5.55
Fontana,Calif. K1 ... 6.60
Gary,Ind. U5 ... 5.55
Ind.Harbor,Ind. I-2 ... 5.55
IndianaHarbor,Ind. Y1 ... 6.05
Johnstown,Pa. B2 ... 5.55
Lackawanna,N.Y. B2 ... 5.55
LosAngeles B3 ... 6.25
Pittsburgh J5 ... 5.55
Seattle B3 ... 6.30
So.Duquesne,Pa. U5 ... 5.55
So.SanFrancisco B3 ... 6.30
Struthers,O. Y1 ... 6.05
Youngstown U5 ... 5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ... 4.55
BeaverFalls,Pa.M12,R2 ... 4.55
Buffalo B5 ... 4.60
Camden,N.J. P13 ... 5.00
Carnegie,Pa. C12 ... 4.55
Chicago W18 ... 4.55
Cleveland A7, C20 ... 4.55
Detroit P17 ... 4.70
Donora,Pa. A7 ... 4.55
Elyria,O. W8 ... 4.55
FranklinPark,Ill. N5 ... 4.55
Gary,Ind. R2 ... 4.55
GreenBay,Wis. F7 ... 4.55
Hammond,Ind. I-2, M13 ... 4.55
Hartford,Conn. R2 ... 5.10
Harvey,Ill. B5 ... 4.55
LosAngeles R2 ... 6.00
Mansfield,Mass. B5 ... 5.10
Massillon,O. R2, R8 ... 4.55
Monaca,Pa. S17 ... 4.55
Newark,N.J. W18 ... 5.00
Plymouth,Mich. P5 ... 4.80
Pittsburgh J5 ... 4.55
Putnam,Conn. W18 ... 5.10
Readville,Mass. C14 ... 5.10
St.Louis,Mo. M5 ... 4.95
So.Chicago,Ill. W14 ... 4.55
SpringCity,Pa.(5) K5 ... 5.00
Struthers,O. Y1 ... 4.55
Waukegan,Ill. A7 ... 4.55
Youngstown F3, Y1 ... 4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ... 5.40
BeaverFalls,Pa. M12 ... 5.40
Bethlehem,Pa. B2 ... 5.40
Buffalo B5 ... 5.40
Camden,N.J. P13 ... 5.80
Canton,O. R2 ... 5.40
Canton,O.(29) T7 ... 4.90
Carnegie,Pa. C12 ... 5.40
Chicago W18 ... 5.40
Cleveland A7 ... 5.45
Cleveland C20 ... 5.40
Detroit P17 ... 5.55
Donora,Pa. A7 ... 5.45
Elyria,O. W8 ... 5.40
Gary,Ind. R2 ... 5.40
Hammond,Ind. I-2, M13 ... 5.40
Hartford,Conn. R2 ... 5.85
Harvey,Ill. B5 ... 5.40
Lackawanna,N.Y. B2 ... 5.40
Mansfield,Mass. B5 ... 5.85
Massillon,O. R2, R8 ... 5.40
Midland,Pa. C18 ... 5.40
Monaca,Pa. S17 ... 5.40
Newark,N.J. W18 ... 5.75
Plymouth,Mich. P5 ... 5.60
So.Chicago,Ill. R2, W14 ... 5.40
Struthers,O. Y1 ... 5.40
Warren,O. C17 ... 5.40
Waukegan,Ill. A7 ... 5.45
Worcester,Mass. A7 ... 5.75
Youngstown F3, Y1 ... 5.40

RAIL STEEL BARS
ChicagoHts.(3,4) C2 ... 4.75
ChicagoHts.(5,4) I-2 ... 4.50
Franklin,Pa.(3, 4) F5 ... 4.75
FortWorth,Tex.(26) T4 ... 4.85
Huntngtn,W.Va.(3) W7 ... 5.50
Marion,O.(3) P11 ... 4.75
Moline,Ill.(3) R2 ... 3.80
Tonawanda (3,4) B12 ... 4.75
Williamsport(3) S19 ... 5.00
Williamsport(4) S19 ... 5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt) U1 ... 15.00
Dover,(Eng.Bolt)* U1 ... 13.50
Dover(Wrgt.Iron) U1 ... 12.25
Economy,Pa. (S.R.) B14 ... 9.60
Economy,Pa.(D.R.)B14 ... 11.90
Economy,(Staybolt)B14 ... 12.20
MeK.Rks.(Staybolt) L5 ... 14.50
MeK.Rks.(S.R.) L5 ... 9.60
MeKRks.(D.R.) L5 ... 13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ... 3.70
Alton,Ill.(6) L1 ... 3.70
Atlanta A11 ... 4.25
Buffalo R2 ... 3.70
Cleveland R2 ... 3.70
Emeryville,Calif. J7 ... 4.45
Fairfield,Ala. T2 ... 3.70
Fontana,Calif. K1 ... 4.40
Gary,Ind. U5 ... 3.70
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.70
Johnstown,Pa. B2 ... 3.70
KansasCity,Mo. S5 ... 4.30
Lackawanna,N.Y. B2 ... 3.70
LosAngeles B3 ... 4.40
Marion,O. P11 ... 5.00
Milton,Pa. B6 ... 4.20
Minnequa,Colo. C10 ... 4.50
Niles,Calif. P1 ... 5.05
Pittsburg,Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland,Oreg. O4 ... 4.65
SandSprings,Okla. S5 ... 4.60
Seattle B3, N14 ... 4.45
So.Chicago,Ill. R2 ... 3.70
So.Duquesne,Pa. U5 ... 3.70
So.SanFrancisco B3 ... 4.45
SparrowsPoint,Md. B2 ... 3.70
Struthers,O. Y1 ... 3.70
Torrance,Calif. C11 ... 4.40
Youngstown R2, U5 ... 3.70

BARS, Reinforcing
(Fabricated, to Consumers)
Huntington,W.Va. W7 ... 5.50
Johnstown, ¾-1" B2 ... 4.75
LosAngeles B3 ... 5.45
Marion,O. P11 ... 5.00
Seattle B3 N14 ... 5.55
So.SanFrancisco B3 ... 5.45
SparrowsPt., ¾-1" B2 ... 4.75
Williamsport,Pa. S19 ... 5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ... 3.60
Ashland,Ky.(8) A10 ... 3.60
Butler,Pa. A10 ... 3.60
Cleveland J5, R2 ... 3.60
Conshohocken,Pa. A3 ... 4.00
Detroit M1 ... 4.40
Ecorse,Mich.(8) G5 ... 3.80
Fairfield,Ala. T2 ... 3.60
Fontana,Calif. K1 ... 4.55
Gary,Ind. U5 ... 3.60
Geneva,Utah G1 ... 3.70
GraniteCity,Ill. G4 ... 4.30
Ind.Harbor,Ind. I-2,Y1 ... 3.60
Irvin,Pa. U5 ... 3.60
Lackawanna,N.Y. B2 ... 3.60
Munhall,Pa. U5 ... 3.60
Niles,O. N12 ... 5.25
Pittsburg,Calif. C11 ... 4.30
Pittsburgh J5 ... 3.60
Sharon,Pa. S3 ... 4.00
So.Chicago,Ill. W14 ... 3.60
SparrowsPoint,Md. B2 ... 3.60
Steubenville,O. W10 ... 3.60
Torrance,Calif. C11 ... 4.30
Warren,O. R2 ... 3.60
Weirton,W.Va. W6 ... 3.60
WestLeechburg,Pa. A4 ... 3.75
Youngstown U5, Y1 ... 3.60

SHEETS, H.R., (19 gage)
AlabamaCity,Ala. R2 ... 4.75
Dover, O. R1 ... 5.65
Ind.Harbor,Ind. I-2 ... 5.40
Mansfield,O. E6 ... 5.65
Niles,O. N12 ... 5.75
Torrance,Calif. C11 ... 5.40

SHEETS, H.R. (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ... 5.40
Conshohocken,Pa. A3 ... 5.65
Ecorse,Mich. G5 ... 5.95
Fairfield,Ala. T2 ... 5.40
Fontana,Calif. K1 ... 6.35
Gary,Ind. U5 ... 5.40
Ind.Harbor,Ind. I-2 ... 5.40
IndianaHarbor,Ind. Y1 ... 5.90
Irvin,Pa. U5 ... 5.40
Lackawanna(35) B2 ... 5.40
Pittsburgh J5 ... 5.40
Sharon,Pa. S3 ... 5.40
So.Chicago,Ill. U5 ... 5.40
SparrowsPoint(36) B2 ... 5.40
Warren,O. R2 ... 5.40
Weirton,W.Va. W6 ... 5.75
Youngstown U5 ... 5.40
Youngstown Y1 ... 5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ... 6.55
Ecorse,Mich. G5 ... 7.10
Fontana,Calif. K1 ... 7.50
Gary,Ind. U5 ... 6.55
IndianaHarbor,Ind. Y1 ... 7.05
IndianaHarbor,Ind. I-2, ... 6.55
Irvin,Pa. U5 ... 6.55
Lackawanna(37) B2 ... 6.55
Pittsburgh J5 ... 6.55
SparrowsPoint(38) B2 ... 6.55
Warren,O. R2 ... 6.55
Weirton,W.Va. W6 ... 6.90
Youngstown Y1 ... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana, Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.95
Ind.Harbor, Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. E1	5.00
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.00
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubensville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(30) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

ROOFING SHORT TERNES (8 lb. coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky. (8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

SHEETS, Culvert No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary, U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal C11	6.35	...

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

Coke (Base Box)

	lb	lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2, R2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.,Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn.Conn.(10) S15	5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRiP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32) B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
No.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
New Castle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. NS: Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown CS	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)

Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R. (22 Ga.) COILS (Cut Lengths ½c lower)

	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom,W.Va. W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill. G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower) Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGHTS, SILICON (22 Ga.)

	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bourdi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div. Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

NewBritn.Conn.(10) S15 10.75
Pawtucket,R.I.(11) N... 10.75
Pawtucket,R.I.(12) N... 11.05
Sharon,Pa. S3 ... 10.60
Worcester,Mass. A7 ... 10.90
Youngstown CS ... 10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Berea,O. C7	6.60
Bridgprt,Conn.(10) S15	5.35
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40) T6	4.90
Ind.Harbor,Ind. I-2	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles C1	6.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	5.35
NewCastle,Pa. B4	5.35
NewCastle(40) E5	5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(21) NS	5.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.25
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown CS (40)	5.25
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown CS	5.25

STRIP Hot-Rolled Ingot Iron

Ashland,Ky. (8) A10 ... 3.75
Warren,O. R2 ... 4.10

STRIP Cold-Rolled Ingot Iron

Warren,O. R2 ... 5.25

TIGHT COOPERAGE HOOP

Atlanta A11 ... 4.05
Riverdale,Ill. A1 ... 3.90
Sharon,Pa. S3 ... 4.15
Youngstown U5 ... 3.75

WIRE Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Alabama City R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19) K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville MS	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet Ill. A7	5.70	6.15
Kansas City,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen,Pa. P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18) P12	6.10	6.60
Rankin,Pa. A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1) N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Fostoria, O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers, O. Y1	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ... 4.85
Aliquippa,Pa. J5 ... 4.85
Atlanta A11 ... 5.10
Alton,Ill.(1) L1 ... 4.85
Bartonville,Ill.(1) K4 ... 4.85
Buffalo W12 ... 4.85
Chicago W13 ... 5.10
Cleveland A7, C20 ... 4.85
Crawfordsville,Ind. MS ... 5.10
Donora,Pa. A7 ... 4.85
Duluth,Pa. A7 ... 4.85
Fairfield,Ala. T2 ... 4.85
Fostoria,O.(24) S1 ... 5.35
Houston S5 ... 5.25
Johnstown,Pa. B2 ... 4.85
Joliet, Ill. A7 ... 4.85
KansasCity,Mo. S5 ... 5.45
Kokomo,Ind. C16 ... 4.95
LosAngeles B3 ... 5.80
Minnequa,Colo. C10 ... 5.10
Monessen,Pa. P7 ... 5.10
Newark, 6-sga. I-1 ... 5.50
No. Tonawanda B11 ... 4.85
Palmer,Mass. W12 ... 5.15
Pittsburg,Calif. C11 ... 5.80
Portsmouth,O. P12 ... 5.25
Rankin,Pa. A7 ... 4.85
So.Chicago,Ill. R2 ... 4.85
So.SanFrancisco C10 ... 5.80
SparrowsPoint,Md. B2 ... 4.95
Sterling,Ill.(1) N15 ... 4.85
Struthers,O. Y1 ... 4.85
Torrance,Calif. C11 ... 5.80
Waukegan,Ill. A7 ... 4.85
Worcester,Mass. A7, T6 ... 5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 ... 6.20
Buffalo W12 ... 6.35
Cleveland A7 ... 5.85
Crawfordsville,Ind. MS ... 6.20
Detroit D2 ... 6.20
Dover,O. G6 ... 6.20
Fostoria,O. S1 ... 6.00
Kokomo,Ind. C16 ... 5.70
FranklinPark,Ill. T6 ... 6.20
Massillon,O. R8 ... 5.85
Monessen,Pa. P16 ... 5.85
Monessen,Pa. P7 ... 6.10
NewHaven,Conn. D2 ... 6.50
Pawtucket,R.I.(12) N8 ... 6.85
Trenton,N.J. R5 ... 6.15
Worcester A7 ... 6.15
Worcester T6 ... 6.50
Worcester W12 ... 6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4 ... 8.90
Buffalo W12 ... 8.90
Chicago W13 ... 8.90
Cleveland A7 ... 8.90
Crawfordsville,Ind. MS ... 8.95
Fostoria,O. S1 ... 8.90
Johnstown,Pa. B2 ... 8.90
Kokomo,Ind. C16 ... 8.90
Monessen,Pa. P16 ... 8.90
Palmer,Mass. W12 ... 9.20
Portsmouth,O. P12 ... 8.90
Roebling,N.J. R5 ... 9.20
Waukegan,Ill. A7 ... 8.90
Worcester,Mass. A7, T6 ... 9.20

WIRE, Galv'd ACSR For Cores

Bartonville,Ill. K4 ... 8.50
Monessen,Pa. P16 ... 8.50
Roebling,N.J. R5 ... 8.80
SparrowsPoint,Md. B2 ... 8.60
Johnstown,Pa. B2 ... 8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4 ... 10.90
Monessen,Pa. P16 ... 11.40
Roebling,N.J. R5 ... 11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 ... 6.25
Alton,Ill.(1) L1 ... 6.25
Bartonville,Ill.(1) K4 ... 6.25
Buffalo W12 ... 6.25
Cleveland A7 ... 6.25
Donora,Pa. A7 ... 6.25
Duluth A7 ... 6.25
Fostoria,O. S1 ... 6.25
Johnstown,Pa. B2 ... 6.25
LosAngeles B3 ... 7.20
Milbury,Mass.(12) N6 ... 8.05
Monessen,Pa. P7, P16 ... 6.25
Palmer,Mass. W12 ... 6.55
Pittsburg,Calif. C11 ... 7.20
Roebling,N.J. R5 ... 6.55
Portsmouth,O. P12 ... 6.25
So.Chicago,Ill. R2 ... 6.25
So.SanFrancisco C10 ... 7.20
SparrowsPoint,Md. B2 ... 6.35
Struthers,O. Y1 ... 6.25
Trenton,N.J. A7 ... 6.55
Waukegan,Ill. A7 ... 6.25
Worcester A7, T6, W12 ... 6.55
Worcester,Mass. J4 ... 6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5 ... 5.90
Alton,Ill.(1) L1 ... 5.90
Buffalo W12 ... 5.90
Cleveland A7 ... 5.90
Donora,Pa. A7 ... 5.90
Duluth A7 ... 5.90
Johnstown,Pa. B2 ... 5.90
LosAngeles B3 ... 6.85
Monessen,Pa. P7, P16 ... 5.90
NewHaven,Conn. A7 ... 6.20
Palmer,Mass. W12 ... 6.20
Pittsburg,Calif. C11 ... 6.85
Portsmouth,O. P12 ... 5.90
Roebling,N.J. R5 ... 6.20
So.Chicago,Ill. R2 ... 5.90
SoSanFrancisco C10 ... 6.85
SparrowsPoint,Md. B2 ... 6.00
Torrance,Calif. C11 ... 6.85
Trenton,N.J. A7 ... 6.20
Waukegan,Ill. A7 ... 5.90
Worcester,Mass. A7 ... 6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2 ... 126
Ala.City,Ala. 17-18ga.R2 ... 213
Aliquippa,Pa.9-14½ga.J5 ... 130
Atlanta A11 ... 133
Bartonville,Ill.(19) K4 ... 130
Crawfordsville,Ind. MS ... 132
Donora,Pa. A7 ... 130
Duluth A7 ... 130
Fairfield,Ala. T2 ... 130
Houston,Tex. S5 ... 138
Johnstown,Pa. B2 ... 130
Johnstown,17ga.,6" B2 ... 204
Johnstown,17ga.,4" B2 ... 207
Joliet,Ill. A7 ... 130
KansasCity,Mo. S5 ... 142
Kokomo,Ind. C16 ... 132
Minnequa,Colo. C10 ... 138
Monessen,Pa. P7 ... 135
Pitsburg,Calif. C11 ... 153
Portsmouth,O.(18) P12 ... 137
Rankin,Pa. A7 ... 130
So.Chicago,Ill. R2 ... 126
Sterling,Ill.(1) N15 ... 130

FENCE POSTS

ChicagoHts.,Ill. C2 ... 140
Duluth A7 ... 125
Franklin,Pa. F5 ... 140
Huntington,W.Va. W7 ... 140
Johnstown,Pa. B2 ... 140
Marion,O. P11 ... 140
Minnequa,Colo. C10 ... 130
Moline,Ill. R2 ... 136
So.Chicago R2 ... 140
Tonawanda B12 ... 140
Williamsport,Pa. S19 ... 150

WIRE, Barbed

	Col.
AlabamaCity, Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville MS	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville MS	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill. (19) K4	5.95
Crawfordsville,Ind. MS	6.30
Donora,Pa. A7	5.95
Duluth A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. W10	7.15

NAILS & STAPLES, Stock To dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa. (13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester, Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.80
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.10

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburgh,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

AXLES

Ind.Harbor,Ind. S18	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	... (16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williampsort,Pa. S19	...	...	...	4.75

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	1s,25W,4.25Cr,1V,4.75Co	185.50
Cr. Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J2, L3, M14, S8, U4, V2, V3.

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield, S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. Internatoinal Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 YoungstownSheet&Tube

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.2c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c,finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.55c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 24" and narrower.
(37) 15 gage & lighter, 60" & narrower.
(38) 14 gage & lighter, 48" & narrower.
(39) 18" and narrower.
(40) Lighter than 0.055", 0.055" and heavier, 0.25c higher.

Old King Cole was a merry old soul,
And a wise old soul was he.
He enjoyed his fiddlers, his pipe and his bowl
Because they were top quality.

When the King called for wire, he got the best,
As a wise buyer always should;
For he knew that Wickwire meets every test —
That on every job, it's good.

Same as the Sire, when you need wire —
Any temper, finish or grade —
Make sure you require famous Wickwire wire,
And you'll have the best that's made.

WICKWIRE WIRE

CF&I & SUBSIDIARIES

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION • THE COLORADO FUEL AND IRON CORPORATION

WIRE SALES OFFICE—361 Delaware Ave., Buffalo 2, N. Y. **EXECUTIVE OFFICE**—500 Fifth Ave., New York 18, N. Y.

SALES OFFICES—Atlanta • Boston • Buffalo • Chicago • Denver • Detroit • New York • Philadelphia

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corp., Oakland 6, Cal.

STANDARD PIPE, T. & C.

BUTT-WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	.5c	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.18	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	78.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼ % on 3½" and 4"; Youngstown Y1; Aliquippa, Pa., J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4". Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ¼-⅜"; Benwood, W. Va. W10, except plus 3½% on ¼", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ¼", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ⅛" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1, Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. in.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2½	12	26.92	32.97	26.98	31.76
2¾	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base Both Sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Cu Base Both Sides
302	....	....	....	19.75	27.50	77.00
304	25.00	28.00–29.50	....	20.75–24.50	27.50	77.00
309	30.50	35.00	....	....	....	....
310	36.50	41.00	....	....	....	144.00
316	29.50	31.50–34.00	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....
318	38.50	38.00	....	....	....	....
321	26.50	31.00	....	23.00	33.00	111.00
347	27.50	30.50–32.00	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....
410	20.75	27.25	....	....	....	....
Nickel	33.25	44.25	41.00	54.00	....	....
Inconel	41.00	53.50	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, Inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ⅝-in. 18.5
- ¾-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, al diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fiting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅝-in. .	12	6.5
¾-in.-1-in. ..	9	1
1⅛ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in.	16.5	6.5
¾-in.-1½-in. ..	12	2
1⅝-in. & larger	8.5	2
C.P. Hex.		
½-in. & smaller	26	22
⅝-in. & ⅝-in. .	23	17.5
¾-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or key quantities)

	Reg.	Hvy.
½-in. & smaller....	35	28.5
⅝-in. & ⅝-in. ...	29.5	22
¾-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
	Light	
⅞-in. & smaller	35	
½-in. to ⅝-in.	28.5	
¾-in. to 1½-in.	26	

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....48 & 10
Plated finishes ...31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. ... 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger.... 16
N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.85c
⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
4.5⅛	40	21.50
3	40	22.61
2½	24,30	23.15
2	24,30	25.36

CARBON

40	100,110	8.03
35	100,110	8.03
30	84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03
14	60,72	8.57
10,12	60	8.84

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	36.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.
Brackenridge, Pa., sheets A4.
Bridgeville, Pa., bars, wire, sheets & strip U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502, A10.
Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.
Cleveland, strip A7.
Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.
Dunkirk, N.Y., bars, wire A4.
Duquesne, Pa., bars U5.
Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6.
Gary, Ind., sheets except Type 416 U5.
Harrison, N. J., strip C18.
McKeesport, Pa., bars, sheets except Type 416 U5.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only P2.
Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars U5.
Pittsburgh, sheets C18.
Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.
Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.
So. Chicago, Ill., bars & structurals U5.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars, U4.
Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.
Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, A4.
Youngstown, strip, except Types 303, 3099, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia .$32-$45
Cents per pound, ovens
Phenol, 40 (carlots, nonreturnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

	Cents
Sponge iron	
98+% Fe, carlots..	16.00
Swedish, c.i.f. New York, in bags ...7.40-8.50	
Electrolytic Iron:	
Annealed, 99.5% Fe	42.50
Unannealed, 99 + % Fe	36.50
Unannealed, 99 + % Fe (minus 325 mesh)	58.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns ..83.00-148.00	
Aluminum:	
Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	33.50
Brass, 10-ton lots	30.00-33.25
Bronze, 10-ton lots 51.25-60.00	
Phosphor-Copper, 10 tons	50.00
Copper:	
Electrolytic	43.25
Reduced 33.75-37.00	
Lead 25.50	
Magnesium 75.00-85.00	
Manganese:	
Minus 100-mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed ...	83.00
Nickel-Silver, 10-ton lots	44.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainles Steel, 302 ..	83.00
Zinc, 10-ton lots .23.00-30.50	
Tungsten:	Dollars
99%, minus 80 to 200 mesh, freight allowed:	
1000 lb and over .	4.00
Less than 1000 lb ..	4.15
98.8% minus 65 mesh, freight allowed:	
1000 lb. and over ...	4.15
less than 1000 lb. ...	4.25
Molybdenum:	
99%, minus 80 to 200 mesh,	
over 500 lb.	2.85
200 to 500 lb.	3.10
less than 200 lb. ...	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

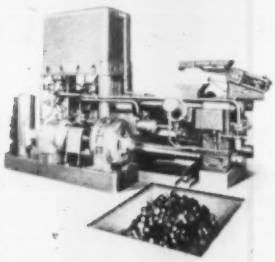
Connellsvll.fur. ..$14.50-15.00
Connelsvll.fdry. .17.00-18.00
New River, foundry...21.30
Wise county, foundry..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens $22.75
Everett, Mass., ovens
New England, del..*24.80
Chicago, ovens 23.00
Chicago, del. 24.40
Terre Haute, ovens....22.50
Milwaukee, ovens 23.75
Indianapolis, ovens 22.75
Chicago, del. 26.28
Cincinnati, del. 25.73
Detroit, del. 26.71
Ironton, O., ovens 22.50
Cincinnati, del. 25.12
Painesvile, O., ovens..24.00
Cleveland, del. 25.75
Erie, Pa., ovens 23.50
Birmingham, ovens 20.30
Birmingham, del. 21.09
Philadelphia, ovens 22.70
Nevillelsland,Pa.,ovens 23.00
Swedeland, Pa., ovens..22.60
St. Louis, ovens
St. Louis, del. 25.40
Portsmouth, O., ovens..22.50
Cincinnati, del. 25.12
Detroit, ovens 24.00
Detroit, del. 25.00
Buffalo, del. 26.75
Flint, del. 26.49
Pontiac, del. 25.42
Saginaw, del. 26.81

* Or within $4.15 freight zone from works.

RECLAIM VITAL SCRAP!

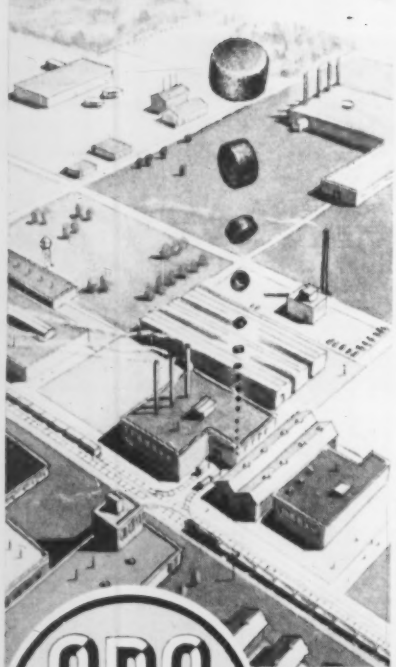


Conserve critical metals, increase self-sufficiency, and reduce scrap handling and storage problems with a MILWAUKEE Briquetting Press. This machine efficiently converts bulk borings, turnings, chips and shavings AUTOMATICALLY into dense cylindrical briquettes that are classified as **high grade scrap**, suitable for direct charging into foundry cupola or furnace.

Steel, cast iron, bronze, magnesium, aluminum, brass and other metals all can be "briquetted" by means of a MILWAUKEE Press. It keeps scrap in your own hands and facilitates quality control. In addition, a MILWAUKEE briquetting press conserves vital time and space required for bulk scrap handling.

Capable of converting from ¾ to more than 3½ tons of scrap per hour, hydraulically-operated MILWAUKEE presses require minimum space and maintenance. Six different sizes are available to meet specific production requirements.

Now that the "squeeze" is on, leading manufacturers in the metal working industry are utilizing MILWAUKEE briquetting presses to solve their vital material and scrap problems. Write today for Bulletin No. 117 containing data, specifications and case history information on MILWAUKEE AUTOMATIC HYDRAULIC BRIQUETTING PRESSES.



158-81

SPO

MILWAUKEE *Foundry Equipment Division*

CASTINGS ARE PERMANENT

6495 Grand Division Avenue • Cleveland 25, Ohio

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.50	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	6.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	5.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	6.05	6.85	8.20	6.00	...	6.00	6.85	10.55	6.23	6.33	7.53
St. L. (w'hse)	5.85	6.65	8.00	5.80	...	5.80	6.65	10.35	6.03	6.13	7.33
Kans. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Birm'hm (city)	5.75	6.55	6.90[2]	5.70	...[2]	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80*	8.90[3]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60[3]	9.20[3]	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore

Cents per unit, del. E. Pa.

Foundry and basis 56-62% concentrates contract	17.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite, mines	65.00

Manganese Ore

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00
South African Transvaal	
44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb. molybdenum content, mines	$1.00

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.10 per lb of contained V. Delivered, Spot, add 10c. **Crucible-Special Grades** (V 36-56%, Si 2-3.5% max., C 0.5-1% max.), $3.20. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max., C 0.20% max.) $3.30.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max.). Contract, c.l. lump, bulk 7.0c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton 16.0c, less ton 16.9c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size — weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c, c.l. packed 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $4.90 per lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min., C 0.30 max.) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, deld.; less ton lots $3.80.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr, 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18c per lb of alloy; ton lots 19c; less ton lots 20.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 15c per lb of alloy; ton lots 16.50c; less ton lots 17.75c, f.o.b., Niagara Falls; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe) Lump. carload, bulk 14.50c, packed 15.50c; ton lots, packed, 15.75c; less ton lots, packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb. contained Mo, f.o.b. Langeloth, $1.32; Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b, Langeloth $1.14, packed in bags containing 20 lb of molybdenum; Washington, Pa., $1.13.

Note: Current prices on manganese, titanium and chromium alloys appeared on page 171, June 4 issue; silicon, boron and tungsten alloys, page 151, June 11. Refractories prices also were published on page 151, June 11.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Apr. 19, 1951

STEELMAKING SCRAP COMPOSITE

June 14	$44.00
June 7	44.00
May 1951	44.00
June 1950	39.25
June 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade) 1

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry, Steel: *	
20. 2 feet and under	+ 2.00
21. 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+ 10.00
29. Shafting	+ 10.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.
(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.
(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.
(4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and open-hearth furnaces or foundries.
(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.
(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $6; 75% and over, $10; less than 75%, $12.
(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats.	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, switches,	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	—8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames	
22. Uncut	Base
23. Cut	+ 3.00
24. Angle, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.
(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.
(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise ceiling shall not exceed that for base grade (No. 1).

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:

1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable)	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 3 cast iron.
(2) Ceiling shipping point price which any foundry other than a malleable iron producer may pay for Grade 10 shall be ceiling price for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $11.
(8) For preparing into Grade No. 18 or Grade No. 20, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:
(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:
(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless consumer obtains prior written OPS approval.

Commissions

No commissions shall be payable to a broker in excess of $1.

Unprepared Scrap

For unprepared scrap, other than materials suitable for hydraulic compression, ceiling basing point prices shall be $8 per ton beneath ceiling of the prepared base grades.

For unprepared material which when compressed constitutes No. 1 bundles, ceiling basing point price shall be $6 per ton beneath ceiling for No. 1 bundles; or when compressed constitutes No. 2 bundles ceiling basing point price shall be $8 beneath ceiling basing point price for No. 2 bundles.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo,, 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Federal, Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.

HAMILTON, ONT.
(Delivered Prices)

Heavy Melt.	$35.00
No. 1 Bundles	35.00
No. 2 Bundles	34.50
Mechanical Bundles	33.00
Mixed Steel Scrap	31.00
Mixed Borings, Turnings	28.00
Rails, Remelting	35.00
Rails, Rerolling	38.00
Busheling	29.50
Bushelings new factory, prep'd	33.00
Bushelings new factory, unprep'd	28.00
Short Steel Turnings	28.00
Cast Iron Grades*	
No. 1 Machinery Cast	58.00-60.00

* F.o.b. shipping point.

The Metal Market

Entire manufacturing economy may be brought under compulsory allocation of metals on Oct. 1. NPA to ask for reports on copper and aluminum needs for fourth quarter

MEASURES to put the distribution of refined copper and red metal scrap under complete allocation are being considered by NPA. This move will be necessary for the successful distribution of available materials under CMP.

Requirements for defense and defense-supporting activities are expected to increase still further in the next six to nine months. The brass and bronze ingot industry expects an increase in rated orders after July 1. Rated orders at present range from 20 to 60 per cent of the industry's total output, depending on individual plants.

Toll agreements between fabricators and owners for processing scrap into unalloyed copper will be prohibited after Aug. 1 unless authorized by NPA. This would not apply to railroads desiring to convert journal bearings for their own use. Order will also further limit disposal of scrap and restrict inventory levels.

There is no justification for an increase in the price of copper above the 24.50-cent domestic level, OPS officials maintain. However, special attention is being given to custom smelters who import foreign copper ore and concentrates which are paid for at the New York price for foreign metal, now 27.50 cents a pound. If they don't get price relief, output of refined metal from that source likely will decline. An additional threat to world copper supplies is the labor disturbance in Chile where workers are demanding a wage increase.

Lead Supplies Tighten

Lead supplies are increasingly tight, indicating that full allocation by NPA may be required. Volume of defense rated orders for July delivery is extremely heavy and far in excess of tonnages available.

To meet estimated civilian requirements for 32.3 million automotive storage batteries this year 360,000 tons of lead and 81,000 tons of sulphuric acid are needed. Inventories of both are short, in some cases less than one week. Storage battery industry is largest producer of scrap lead, nearly all used units going into the scrap market. If battery manufacturers were permitted use of all their reclaimed lead instead of sharing with others not producing scrap, part of the lead supply problem would be solved for them.

Zinc Stocks Rise Slowly

Smelters are improving their zinc supply position slowly by restricting the amount of business booked. Stocks have increased steadily from 8884 tons at the end of December to 17,411 tons at the end of May. Unfilled orders have eased to 73,942 tons from 77,293 tons at the end of April.

Shipments are still being made to the government for stockpiling, having amounted to 3040 tons last month. Domestic users are unable to satisfy their needs fully, offerings being limited generally to the amount of new metal coming from the mills. Smelters shipped 73,093 tons to users last month, the largest since April, 1950, while 1434 tons against 2473 tons were for export and drawback account. Production is being maintained close to capacity, having totaled 80,430 tons in May.

Reactivates Forgings Plant

General Services Administration will reactivate the government-owned aluminum forgings plant at Erie, Pa. The plant will be operated under a lease-contract by Willys - Overland Co., Toledo, O. The plant, having capacity of 15 million pounds of finished aluminum forgings a year, is fully equipped and should be in production by early August.

The forgings plant was operated during World War II by Aluminum Forgings Inc., a corporation which was formed solely for that purpose and has been disbanded.

Aluminum Capacity Expanding

Kaiser Aluminum & Chemical Corp., Oakland, Calif., is negotiating with government officials with the aim of doubling the capacity of a large aluminum plant it is building in the New Orelans area and of adding another potline at its Mead aluminum production plant north of Spokane, Wash.

If Defense Minerals Administration authorizes the revision in the New Orleans project plans, Kaiser would receive priorities help in getting materials needed to expand the plant. The company also would receive permission to write off the cost of the addition against taxes in five years instead of the usual 20 years.

The New Orleans plant is scheduled to begin production this fall and to have a capacity of 100,000 tons a year. It was among the projects authorized by the government last December for increasing the country's aluminum capacity by 446,000 tons. Pre-Korea aluminum capacity was about 700,000 tons a year. A DMA official said the December-authorized capacity could be in by the end of 1952.

If Kaiser succeeds in obtaining power from Bonneville Power Administration on an "interruptable" basis, the company will set up an eighth potline to boost production by another 20,000 tons of pig aluminum a year. The Mead plant, now operating on a 24-hour-a-day basis, is turning out 150,000 tons of aluminum annually. The company also has applied for a certificate of necessity to write off depreciation costs of the new line at an accelerated rate.

Defense Production Administration authorized DMA to approve an additional 188,000 tons of aluminum capacity. The agency has yet to authorize new expansion projects under this program. It also has an additional 54,000 tons of new capacity to authorize since this much of the original 446,000 tons expansion has not been placed with a company.

Tin Prices Continue To Drop

Suspension of tin stockpiling by the United States, coupled with the fact that this country has purchased no eastern tin in the second quarter, has forced a series of downward adjustments in the world price. Fairly substantial European and South American buying has taken up part of the slack and has prevented a more severe decline. Consensus in the trade is that this outside support will weaken, permitting the world price to drop to levels sought by American interests.

Reconstruction Finance Corp. lowered its selling price 6 cents a pound on June 13 to $1.23 a pound for Grade A tin. Successive declines have lowered the price to this level from $1.505 on April 11, and $1.39 at the end of May. Further price reductions are believed to be in the offing. W. Stuart Symington, administrator, RFC, indicated recently that he thought the price should be around $1 a pound.

Negotiations are being conducted to renew the tin concentrate purchase contract with Bolivia. The former contract ran out May 31. The Bolivian ambassador to the United States denies that his country is a member of any international tin cartel as charged by Mr. Symington.

A. S. & R. To Expand

American Smelting & Refining Co. plans to expand its plant at Selby, Contra Costa county, California, to step up the production of zinc oxide and lead bullion. The company was granted a certificate of necessity for 60 per cent of its $2,254,000 application.

Keep Scrap Metals Moving

Bridgeport Brass Co., Bridgeport, Conn., will keep its receiving department open during the company's vacation period, June 30-July 8, to accept scrap returns. No shipments from its Bridgeport or Indianapolis plants will be made in that period, but offices will remain open.

Warehouse Association Moves

J. C. Goolsby, executive secretary, Copper & Brass Warehouse Association Inc. opened new offices of the association in the Evans Bldg., 1420 New York Ave., N. W., Washington 5. The telephone numbers are Metropolitan 6583 and 6584.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 44.50c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.75-32.50c; No. 12 foundry alloy (No. 2 grade) 30.75-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.75-33.50c; grade 2, 30.00-31.50c; grade 3, 30.00-30.50c; grade 4, 28.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 123.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.06% max.; other impurities 0.1% max.) 42.50c; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 56.50c; 25-lb pigs, 59.15c; "XX" nickel shot, 60.15c; "F" nickel shot or ingots, for addition to cast iron, 56.50c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $210-$213 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 87.75c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; effective May 23, 1951)

Sheet: Copper 40.18; yellow brass 37.28; commercial bronze, 95% 40.18; 90% 39.78; red brass, 85% 38.86; 80% 38.47; best quality, 38.07; nickel silver, 18%, 50.99; phosphor-bronze grade A, 5%, 59.42.

Rod: Copper, hot-rolled 36.03; cold-drawn 37.28; yellow brass free cutting, 31.70; commercial bronze, 95%, 39.87; 90%, 39.47; red brass 85%, 38.55; 80%, 38.16.

Seamless Tubing: Copper 40.22; yellow brass 40.29; commercial bronze, 90%, 42.44; red brass, 85% 41.77.

Wire: Yellow brass 37.57; commercial bronze, 95%, 40.47; 90%, 40.07; red brass, 85%, 39.15; 80%, 38.76; best quality brass, 38.36.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	....	....
0.135-0.096	12-48	30.6	....	....
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	——Hexagonal—— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 77.00c. Strip, cold-rolled, 83.00c. Rods and shapes, 73.00c. Plates, 75.00c. Seamless tubes, 106.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 60.50c. Strip, cold-rolled 63.50c. Rods and shapes, 58.50c. Plates, 59.50c. Seamless tubes, 93.50c. Shot and blocks, 53.50c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 29.50c.

Copper Anodes: Base 2000 to 5000 lb, f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast 37.37c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98% ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu, 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c, 100 to 500 lb, 73.50c; under 100 lb, 76.50c, f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, $1.39; 500 to 999 lb, $1.395; 200 to 499 lb, $1.40; less than 200 lb, $1.415. Freight allowed east of Mississippi and north of Ohio and Potomac.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 89.40c; 100 or 600 lb drums only, 100 to 500 lb, 76.20c; 700 to 1900 lb, 73.90c; 2000 to 9900 lb, 72.30c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb $1.1500; more than 2000 lb $1.1309. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Stannous Chloride (Anhydrous): In 400 lb bbl $1.0309; 100 lb kegs $1.0409. Freight allowed

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red Brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per lb, cl, delivered eastern refineries)

No. 1 copper 30.00; No. 2 copper 28.00; light copper 27.00; composition red brass 25.50-26.00; radiators 20.50-21.00; heavy yellow brass 20.00-20.50.

REFINERS' BUYING PRICES

(Cents per lb, cl, delivered refinery)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 20.00.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 25.50-26.50; No. 2 24.00-25.00; light copper 22.00-22.50; No. 1 composition red brass 22.00-23.00; No. 1 composition turnings 21.00-22.00; mixed brass turnings 13.00; new brass clippings 20.00-21.00; No. 1 brass rod turnings 19.00; light brass 15.00; clean heavy yellow brass 17.50; new brass rod ends 19.50; auto radiators 17.50-18.00; cocks and faucets, 19.00-19.50; brass pipe 20.00-20.50.

Lead: Heavy 16.50-16.75; battery plates 9.50-10.00; linotype and stereotype 17.00; electrotype 16.00-16.25; mixed babbitt 17.00.

Tin: No. 1 pewter 75.00-80.00; block tin pipe 105.00-110.00; No. 1 babbitt 65.00-70.00.

Aluminum: Clippings 2S 21.50-22.00; old sheets 17.00-17.50; crankcase 17.00-17.50; borings and turnings 13.00-14.00.

Zinc Scrap Ceiling Prices

(Cents per pound, f.o.b. point of shipment) Unsweated zinc dross, 12.25; new clippings and trimmings, 14.50; engravers' and lithographers' plates, 14.50; die cast slabs, min. 90% zinc, 12.25; old zinc scrap, 11.25; forming and stamping dies, 11.25; new die cast scrap, 10.75; old zinc die cast radiator grills, 10.50; old die cast scrap, 9.50.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
June 13-14	24.50	16.80	17.50	123.00	19.00	42.00	56.60	87.75
June 8-12	24.50	16.80	17.50	129.00	19.00	42.00	56.50	87.75
June 7	24.50	16.80	17.50	136.00	19.00	42.00	56.50	87.75
June 1-6	24.50	16.80	17.50	136.00	19.00	42.00	56.50	90.16
May 10-31	24.50	16.80	17.50	139.00	19.00	42.00	50.50	90.16
May 1-9	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 17-30	24.50	16.80	17.50	142.00	19.00	42.00	50.50	90.16
Apr. 12-16	24.50	16.80	17.50	147.00	19.00	42.00	50.50	90.16
May Avg.	24.50	16.80	17.50	139.923	19.00	42.00	50.50	90.16
Apr. Avg.	24.50	16.80	17.50	145.735	19.00	42.00	50.50	90.16
Mar. Avg.	24.50	16.80	17.50	145.730	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime west, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Sheets, Strip . . .

Sheet and Strip Prices, Pages 151 & 152

Cleveland—Flat-rolled steelmakers' schedules on rated tonnage are being lined up for third quarter, but producers are uncertain just what tonnage will be left for unrated account. "Free" tonnage will be smaller than in second quarter but mandatory restrictions on use in civilian durable goods will likely ease demand pressure somewhat.

Meanwhile, pending effective date of the Controlled Materials Plan, July 1, some manufacturers who come under the plan, need spot assistance in obtaining supplies to support current operations.

Armco Steel Corp. has developed a new electrical steel that can be operated at very high inductions.

Youngstown — Youngstown Sheet & Tube Co. recently was forced to temporarily close its 12-in merchant mill at Struthers and reduce its hot strip operations about 35 per cent because of a shortage of semifinished due to a labor slowdown at its Campbell works. General Fireproofing Co. cut its pressroom schedules to three days because of the resulting steel shortage. Also, a strike of cranemen at U. S. Steel's McDonald mills forced closing down of the 43-in. strip mill at the plant several days.

Boston — Shortage of hot strip forced temporary suspension of cold-rolled strip production at the New Haven, Conn., plant, American Steel & Wire Co. Volume of hot-rolled sheets for third quarter beyond rated and defense-supporting industries will be small. Ratio of this type of bookings with stamping shops is increasing. Those supplying automotive components are confronted with less tonnage next quarter.

New York—Booked well over increased set-aside limits on hot-rolled sheets for third quarter most mills have little or no non-rated tonnage available. Scheduled reduction in automobile and carbuilding, third quarter, is not easing flat-rolled to any extent; tonnage lopped off for these is channeled into defense-supporting industries.

Philadelphia — Most third quarter civilian sheet tonnage will be delinquent volume on which the mills are behind on delivery. Practically no new orders for the period have been taken, but most mills will make a special effort to reduce carryovers before advent of CMP in workable form.

Pittsburgh — Despite automotive cutback under M-68 there will be little cold rolled sheet available here. Hot rolled will be almost off the market. Conversion is increasing here.

Substantial galvanized sheet demand will be transferred from the Pittsburgh to the Chicago district when the Standard Railway Equipment Mfg. Co. moves its car roof manufacturing facilities from New Kensington, Pa., to Hammond, Ind. This company is believed to be the second largest consumer of galvanized sheets, fabricating somewhere between 30,000 and 40,000 tons per year.

Chicago—With the 45 day lead time for August having been passed last week sheet producers are freezing their schedules for that month. A tremendous amount of paper work

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is involved in transition to CMP. It is apparent there will be more free cold-rolled sheets than hot-rolled. Without exception consumers of civilian durable goods are taking their full quotas.

Cincinnati—Rated requirements for third quarter are being estimated by district mills and the outlook is for definitely less tonnage for other consumers.

St. Louis — Sheet allocations for August and September are out, most representing varying cuts under June. The district is receiving a number of directives shifting rated output to the atomic program.

Birmingham—A. V. Wiebel, Tennessee Coal, Iron & Railroad Co. president, disclosed that June defense orders will take 89 per cent of the company's galvanized sheet and 83 per cent of its hot rolled sheets.

Seattle—The state plans to issue windshield stickers in lieu of metal automobile license plates for 1952.

Tin Plate . . .

Tin Plate Prices, Page 152

Chicago—Tin plate production and distribution proceeds under fewer restrictions and allocations than most steel products but supplies are tight.

Steel Bars . . .

Bar Prices, Page 151

Boston — Limited bar supply is likely to continue under CMP for varied consumers qualifying under "B" products due to absence of industry advisory committees authorized to negotiate with NPA on allotments. Allocations have been established for textile machinery builders and several larger groups under DO-70 including industrial fasteners for third quarter, but numerous smaller bar users appear to be going it alone. Where they have filed for allotments individually, most estimated requirements will go through the CMP wringer.

New York—Most metalworking industries using bars and sheets in fabricating end products, including automobiles, are worse off on bars than sheets. Tightening controls of basic alloying elements is intensifying pressure for use of leaner alloys for more goods. This includes wrenches and other hand tools for which the 1300 series is urged. Bolt and rivet producers may expect some increase in bar shipments under DO-70.

Philadelphia — Third quarter bar tonnage is sold up. Heavier bites for defense orders, plus fix allocations, have reduced civilian volume. If the same pattern holds under CMP, amount of civilian tonnage left for distribution will be small.

Pittsburgh — Converters of hot-rolled bars expect 90 per cent base period tonnage specified under order M-1 amended. Defense needs continue at 55 per cent for hot-rolled bars and 50 per cent for cold-rolled. Less than 15 per cent free tonnage will be available in July. Alloy bars remain unobtainable.

Cleveland—Expectations are pressure for bars on defense account will continue right through third quarter. As a result there is little prospect for any particular easing in supply condi-

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tions for the general market in sight. Cutbacks in civilian durable goods production will ease pressure on the market in some directions but this will be more than offset by rising emergency requirements.

Plates . . .

Plate Prices, Page 151

New York — Although more light gage plates are coming off strip mills virtually no civilian unrated plate tonnage is available for July. This is likely to continue through third quarter. Contrary to former experience, there is little substituting for universal or sheared carbon plates. Floor plate, clad stock and other specialties are also taken up by directives, or restrictions on clad inserts. Rolled armor plate schedules are heavy with some mills, and heavy gages for industrial components, including weldments account for more tonnage, mostly rated. Close to 6000 tons of light gage Belgian plates were sold in the East.

Boston—Near the vanishing point for July, volume of unrated plate tonnage for remainder of third quarter will be nil. Directives are increasing for defense work at a higher rate than for New England fabricating shops.

Philadelphia—Plates are being allocated for 40 fast cargo ships placed several months ago. Long hauls and high freights are involved, some producers in eastern Pennsylvania to supply Gulf port yards in part.

Pittsburgh—Demand for light and heavy plates continues at high level. Defense and defense requirements will take nearly all of July production.

Birmingham—While not quite so high in the matter of defense orders, 71 per cent of all the plates produced in the immediate district will be so earmarked this month.

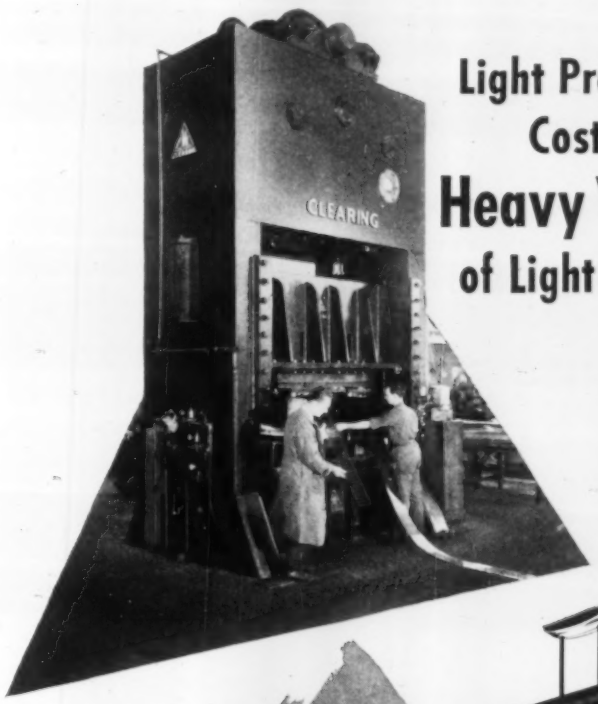
Seattle—Several thousand tons of plates are required for military storage tanks at Ladd Field, Alaska, McChord and Spokane, Wash., Missoula, Mont., and Whidby Island, Wash. A storage tank job at Pasco, Wash., for Standard Oil Co. is near award.

Wire . . .

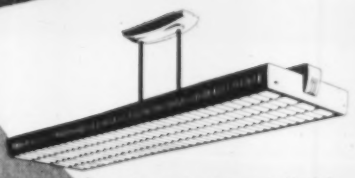
Wire Prices, Page 153

Washington—Office of Price Stabilization is considering removal of wire and cable from machinery price regulation CPR 30. Ultimately, items would come under the general price freeze. Ceiling regulation based on price lists filed with OPS is recommended. Industry representative argue wire and cable are mill products and do not belong in the machinery order.

Boston—No satisfactory substitute existing for nickel-chromium wire in heating element units, electric housewares industry wants 62 tons allocated each quarter. This includes tonnage for toasters, heating pads, hot plates, etc. Coated steel wire and specialties are effected by restrictions on metals used with steel. Tinned, brass-plated, zinc coated copper and other specialties are being produced by improvised processes, conserving scarce materials, usually with lighter coating. Upholstered household fur-



Light Production Costs on Heavy Volume of Light Fixtures



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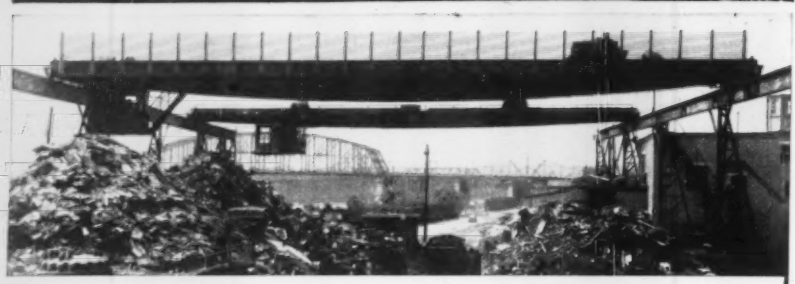

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niture people think they ma be at disadvantage in obtaining wire for springs without CMP allotments under "B" products.

New York—Demand for wire rope has increased materially. Producers in more cases are limited on rod supplies. Requirements for screws are mounting, notably alloys, with an increasing number of DO orders. Declines in automotive demand starting next month are expected, but this industry is taking in all wire due on order until the lid falls.

Birmingham — Relatively small stocks of wire products are held by jobbers. Around 72 per cent of wire production in the Birmingham area this month is going into the defense program.

Tubular Goods . . .

Tubular Goods Prices, Page 155

Boston—Utilities place direct shipment orders with difficulty, notably for lead-in connecting lines for natural gas, approximating 725 miles, 3 to 22-inch. Requirements are met by transfer of allocations in some cases while Belgian pipe is being bought and arrangements made for conversion of imported skelp.

Seattle—Sizable tonnages of cast iron pipe are involved in Alaskan military projects. The government is slow making awards. Bremerton, Wash., opened bids for 400 tons of cast iron pipe and fittings.

Structural Shapes . . .

Structural Shape Prices, Page 151

Boston—But one shop, American Bridge Co., bid double-leaf bascule bridge, Meridian street, Boston, $3,144,550. This is $1,227,750 above engineers' estimate. Closing on approximately 15,000 tons, additional superstructure section, Boston Central Artery, removes bulk of bridge tonnage from active inquiry. Connecticut has two projects, taking 1000 tons. Bulk of tonnage being estimated has ratings, including fair volume of school construction. Bridge tonnage bid at Hartford, June 18, depends on clearance on M-4.

New York—Being an "A" product, fabricated structural steel rating depends on project-owner rather than shop. Plain material is tied into set-asides and warehouse allocations for third quarter. Net result is most shops are estimating no tonnage without directives. Most DO work is behind schedule.

Philadelphia—Less structural tonnage is being estimated. Mills are filled through third quarter on plain material and some DO orders have been pushed out of the schedule. Structural distribution will be thrown into CMP in fourth quarter.

Pittsburgh—Defense requirements take the major portion of shape production. After defense, warehouse and general industrial construction needs are met there will be between 10 and 15 per cent for the non-rated users.

Birmingham — Increasing defense requirements for structurals this month have left a slim margin for other users. It is understood approximately 80 per cent of structural steel produced locally is tagged for defense projects in June.

Seattle—Fabricators' difficulty obtaining structurals is restricting bidding. Order backlogs are substantial. Several Alaskan military installations are pending; also, 4000 tons for McNary dam spillway.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 151

New York—Enough concrete reinforcing steel has been booked to carry fabricators and distributors well through remainder of this year. Despite heavy commitments a large volume of concrete bars and mesh remains to be placed, including some rated tonnage.

Los Angeles—Engineering awards for southern California, southern Nevada and Arizona, totaled $13,993,000 in May, lowest for the month since 1948.

Seattle—Pressure for reinforcing bars is unabated. Mills, booked to capacity to end of the year are turning away many inquiries. Tonnage pends for military construction in the Pacific Northwest and Alaska. Bethlehem Pacific Coast Steel Corp. booked 1100 tons for a hospital here.

Rails, Cars . . .

Track Material Prices, Page 153

Chicago — Pullman-Standard Car Mfg. Co., delivered 3010 new freight cars in May, largest number ever produced in one month by the company, and reflecting better supplies of steel made available under government allocation. In all of last year the company turned out 8830 freight cars. In the first five months this year its production totaled 10,236.

Iron Ore . . .

Iron Ore Prices, Page 157

Cleveland—Bethlehem Steel Co., has contracted with Hanna Coal & Ore Corp., subsidiary of M. A. Hanna Co., for in excess of 30 million tons of Labrador-Quebec ore over a 25-year period. This is the first major contract announced by the developers of the Labrador-Quebec ore fields. Shipments to Bethlehem are expected to begin late in 1954, Bethlehem accepting delivery at Seven Islands on the north bank of the St. Lawrence river, the southern terminal of a 360-mile railroad now being built from Seven Islands to the ore fields. Price for the ore was not disclosed, but it is believed it will be based on the going ore rate at the time shipments are made.

Ore mining was interrupted last week by work stoppage at Minnesota and Michigan mines of the Cleveland Cliffs Iron Co. The strike is in violation of a "no strike" clause in the company's existing agreement with the United Steel Workers of America. Recently, Cleveland Cliffs and other mining companies have been negotiating with the union on job evaluation.

The Great Lakes ore fleet brought down 3,137,789 tons last week. This compares with 2,797,591 tons in the like 1950 week. Shipments in the 1951 shipping season so far total 23,413,464 tons. At this time in the 1950 season only 13,847,415 tons had been received at lower lake ports.

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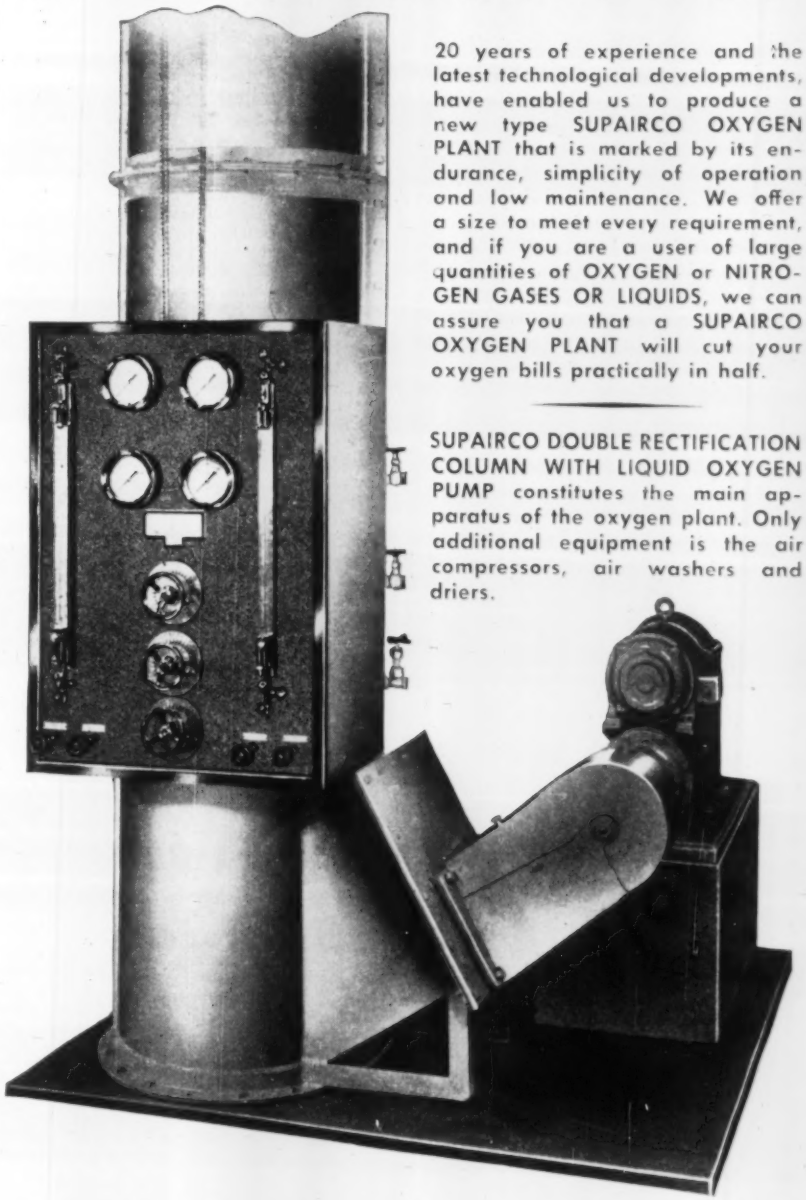

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Pig Iron . . .

Pig Iron Prices, Page 150

Chicago—Jobbing foundries are operating 70 to 75 per cent of capacity, a level determined by supply of metallics and manpower. Pig iron falls short of melting requirements but suppliers are doing a good job allocating to customers the tonnage available. United States Steel Co. did not idle its Gary No. 6 furnace for lining on June 1 as scheduled. Instead No. 12 was taken off June 7 for repairs and relining, and will be down about 70 days. No. 6 will go out for about 30 days when No. 12 resumes.

Philadelphia—One furnace supplying merchant tonnage is going down for repairs July 1. It is spreading production thin to cover June and July, also part of August. Foundry inventories are low and in a few cases where operations are easing for vacation or slower demand pressure for iron shipments has not slackened. Foreign foundry grades have been bought for fourth quarter delivery at higher prices, up to $91 f.a.s. Plate and structural subsidiaries will consume output of Chester, Pa., furnace, now in production, upward to 600 tons daily.

Boston—Few foundries are operating or have backlogs for defense orders near set-aside levels for third quarter, 65 per cent for malleable and 60 per cent gray iron, rough castings in both instances. Regardless of set-aside levels no more iron is in sight for third quarter and increases in rated work will be at expense of civilian tonnage.

New York — Foundries have curtailed production due to lack of pig iron. Several stacks are going down for repairs and supply is becoming critical. Only relief appears to be foreign iron. One shop bought German iron and cost figured $102 per ton at plant.

Buffalo—Tension in the merchant pig iron market is mounting as government requirements increase. Little tapering off has been reported in demand from civilian sources as a result of production curtailments.

Pittsburgh — Pig iron production continues at capacity, all 47 district stacks in operation. Supply is tightening, foundries and steel plants increasing pig use to compensate for lack of scrap. With possibility of two or three stacks going off in the near future supply outlook is bleak.

Cleveland—No slackening in merchant pig iron demand is expected despite cutbacks in civilian goods. Slack will be offset by increased defense requirements. Shipments of merchant iron were up 18 per cent in first quarter compared with the like 1950 period. Total production of iron was up over 11 per cent. Imports were substantial, totaling 315,000 tons in first quarter. However, intake of foreign iron is falling. Despite the bleak supply outlook, pig iron will not be allocated for third quarter. Nor will it be brought under the Controlled Materials Plan. It will continue subject to defense order ratings.

Cincinnati—Shipments of pig iron into this district are holding but needs are far in excess of tonnage. Vacations and cutbacks in some types of melt may ease immediate pressure on the furnaces.

Birmingham—Pig iron users continue to swamp merchant producers with inquiries. Another 50,000 tons a month is a minimum requirement in this district, as matters stand now.

Scrap . . .

Scrap Prices, Page 158

Pittsburgh — Proposal that best five grades be lumped under one price is received with some enthusiasm by brokers and buyers alike. Nothing official has been stated by OPS, however. Expected to eliminate upgrading, such a ruling might cause scrap to move a little faster, particularly lighter grades. Inventories are dangerously low. Collections are fair.

Boston—Most barge shipments of steel scrap are moving to Buffalo area. Beyond a few barges of turnings, movement by water to Sparrows Point is nil.

New York—Sustained high operations by the steel industry without a compensating increase in scrap production has lowered mill inventories far below normal reserves. In some cases steelworks have but one week to 10 days' supply and are moving scrap direct from cars to open hearths.

Buffalo—Approximately 12,000 tons of scrap arrived by water last week. One leading dealer reported a slight pickup in receipts from midstate collection channels.

Philadelphia — Scrap is moving from yards to extent of intake but supply is increasingly critical with steel producers. Emergency allocations are maintaining operations at some mills. More directives on yards are likely, but volume may be limited by small inventories and production problems in preparation.

Detroit—Consistent decline in scrap generation at auto plants is cause of major concern among steel mills. The shortage is resulting in widespread reliance on remote scrap, some coming in from as far as the Gulf states. Open hearth shops have been able to maintain operating rates by relying on inventory.

Chicago — With mills maintaining over-capacity steelmaking rate and scrap consumption exceeding intake, inventories are bordering on the critical. Last week Gary works of United States Steel Co. had reduced its stocks to a six day supply, lowest in history. The company petitioned NPA for allocation relief. More than a month ago similar situation developed at the company's South works and allocation was requested. Small tonnages have been received by direction but the total is not impressive. Other mills in the district are losing ground.

Cincinnati — Mill inventories are low, increased reliance is being placed on allocations. Dealer collections are slower. Most gray iron foundries are getting adequate tonnage, but complain of poor quality.

St. Louis—Supply of free scrap de-

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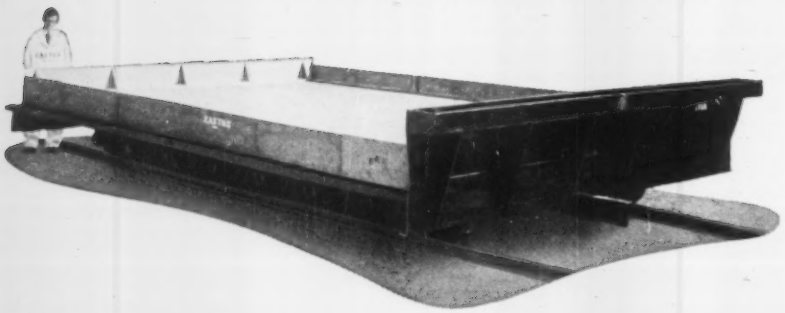

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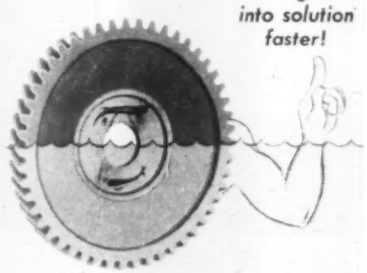

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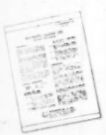
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clines steadily. Mill stocks are down to two to three weeks and some steel foundries' seven to 10 days. Gray iron foundries are in slightly better shape.

Birmingham—Demand for scrap is unabated. Some relatively large shipments are reported to have reached the district from distant points but nobody will talk about them. Scrap men have little on their yards.

San Francisco—Supplies of scrap at one steel mill here dropped so low the company was forced to obtain allocations from southern California. Mills are accustomed to 30 days' inventory and when they get lower than that there is cause for worry. Receipts do not reflect notable success for the scrap collection drive, to date.

Seattle—Receipts of steelmaking and cast iron scrap are improving. Tonnage is insufficient to permit replenishment of inventories. Favorable weather is stimulating shipments.

Warehouse . . .

Warehouse Prices, Page 157

Cleveland — Warehouses expect their allotments under revised M-6 will permit some replenishment of carbon steel stocks from here on. However, whether the mills will be able to ship them up to 85 per cent of their tonnage receipts in the base period as stipulated in M-6 remains to be seen. Some easing in pressure is expected due to plant shutdowns and operations curtailments over the vacation period. Inventories in all products are low and unbalanced, but the stringency is especially severe in alloy items.

Boston—Outlook for distributors of alloy and stainless steel is gloomy. Inventories on all major products are low, however. Alloy volume is confined largely to DO tonnage with warehouses unable to meet many specifications. Under allocation, carbon products are coming in somewhat better volume this month, but unabated demand keeps stocks down.

Pittsburgh — Distributors will get 85 per cent base period receipts as stipulated under M-6 revised. Warehouse inventories are depleted.

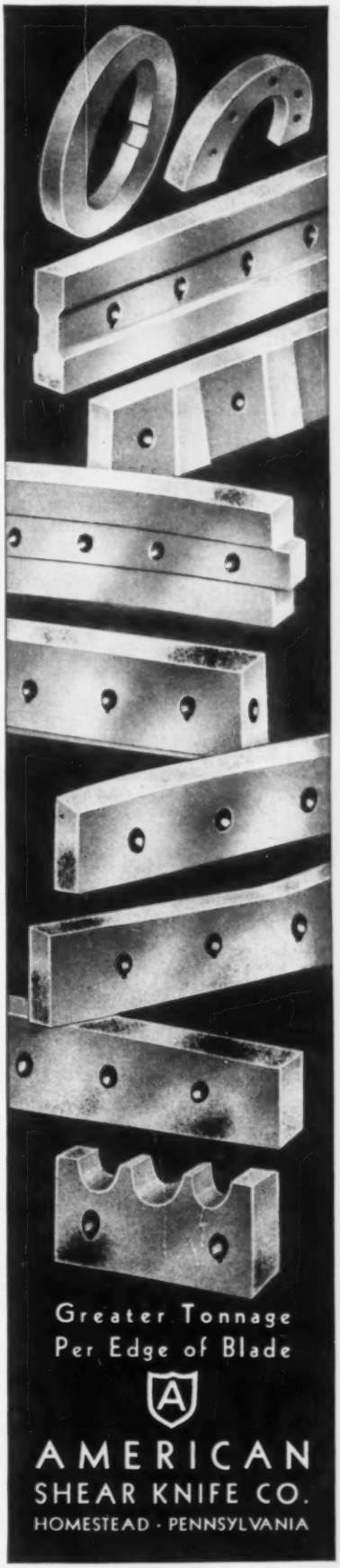
Cincinnati—Mill shipments to warehouses have failed so far to swell in response to amended order M-6, so that stocks are lean throughout the list.

Los Angeles—Warehouse sales are steady but new inquiries are depressed. Distributors attribute the decline to customers' pre-occupation with CMP coupled with a temporary lag in subcontracting.

Seattle—Steel distributors report bulk of sales is on DO account. General trade supplies are insufficient. Inventories are up to 30 per cent under a year ago.

Chrome Ore . . .

Seattle—Grants Pass, Oreg., has been selected as a receiving depot for metallurgical grade chrome ore. The depot will serve northern California, Washington and Oregon. It has been indicated miners will receive $115 a ton for metallurgical grade chrome ore meeting government specifications, delivered at the depot.



Semifinished Steel . . .

Semifinished Prices, Page 151

Youngstown — Steelmaking operations here hold at 105 per cent with 71 open hearths and 3 bessemers engaged. Recent slowdown at Campbell works blooming mill of Youngstown Sheet & Tube Co. caused a semifinished steel shortage. However, settlement of the trouble averted closing down of any primary steel capacity.

Los Angeles—Kaiser Steel Corp.'s Fontana mill added a 200-ton per heat open-hearth, the plant's eighth. Annual ingot capacity, boosted 15 per cent, is 1,380,000 tons.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 155

Pittsburgh—Oven grades continue in short supply but distribution is such foundry and steel plant needs are met. Beehive furnace coke should move slower toward end of this month when one district blast furnace blows out.

Ferroalloys . . .

Ferroalloy Prices, Page 157

Washington — Government price controls on manganese, chrome and several other strategic ores may be lifted, S. M. Ewing, chief, OPS Metals Branch, told the House Committee on Interior & Insular Affairs. These ores are under the general price regulation preserving the maximums received between Dec. 19, 1950 and Jan. 25, 1951. General Services Administration will be given blanket authority to sign contracts with domestic producers at above ceiling prices without clearance from OPS.

Molybdenum concentrates have been placed under allocation control. Order MO-8 permits delivery and receipt of concentrates after June 30 only upon written authorization of OMA. It applies to exports as well as domestic shipments, and also restricts use by producers.

Henderson, Nev.—Manganese, Inc., New York, will start construction this month of a $2.5 million manganese concentration plant for treatment of 1200 tons of manganese ore daily.

San Francisco—Defense Production Administration granted a 75 per cent certificate of necessity for a more rapid tax amortization of a $410,000 expansion in ferrosilicon production by Kaiser Aluminum & Chemical Corp. at Permanente, near Los Altos, Calif.

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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

6000 tons, East Harlem General Hospital, New York, to Harris Structural Steel Co., that city.

1700 tons, air lines terminal, 34th street and Third avenue, New York, to Lehigh Structural Steel Co., Allentown, Pa.

1700 tons, unstated, classified construction, Washington state, to unstated fabricator; L. H. Hoffman, Portland, general contractor.

945 tons, laboratory, Atomic Energy Commission, Dumbarton, S. C., to American Bridge Co., Pittsburgh.

650 tons, resin plant, Firestone Plastics Co., Pottstown, Pa., to Bethlehem Steel Co.; Day & Zimmerman, Philadelphia, general contractors.

630 tons, auditorium, University of Connecticut, Storrs, Conn., to Haarmann Steel Co., Holyoke, Mass.; A. E. Stephens Co., Springfield, Mass., general contractor.

500 tons, grade separations, Van Wyck expressway, Queens, N. Y., to American Bridge Co., Pittsburgh; Vaccus Construction Co., general contractor.

390 tons, state highway bridge, OT-51-2, Ontario-Monroe counties, New York, to Bethlehem Steel Co.; Lane Construction Co., Meriden, Conn., general contractor.

200 tons, laboratory building, Mineola, N. Y., to Kurtz Iron Works, Mineola, N. Y.

215 tons, county building, Herkimer, N. Y., to Bethlehem Steel Co.

STRUCTURAL STEEL PENDING

15,000 tons, fabricated structural and miscellaneous steel superstructure, contract C-2, Central artery, Charles river bridge-Haymarket Square, Boston; Bethlehem Steel Co. bid $6,262,512.30 with esculator maximum of $550,000; American Bridge Co., Pittsburgh, bid $6,946,631.97; bids June 12, Boston.

4000 tons, spillway and other construction, McNary dam; bids late June to U. S. Engineer, Walla Walla, Wash.

2450 tons, double-leaf bascule bridge, Meridian street, Boston; American Bridge Co., Pittsburgh, only bidder, $3,144,550.

1500 tons, (previously reported at 500 tons plus) gates and appurtenances Albeni Falls power dam, Idaho, to Consolidated Western Steel Corp., Seattle.

980 tons, steel tunnel supports and miscellaneous, Eklutna dam and tunnel project, Alaska; bids to Bureau of Reclamation, Palmer, Alaska, June 25.

400 tons, gate hoists, etc., Ross dam, Seattle light department; Willamette Iron & Steel Co., Portland, low $135,686.

260 tons, three 3-span wide flanged beam bridges, Trout river and West Hill brook, Montgomery, Vt.; bids June 22, Montpelier; also 80 tons, reinforcing bars.

150 tons, (including reinforcing) Walla Walla river bridge and overpass, Union Pacific Railway relocation; bids to U. S. Engineer, Walla Walla, Wash., July 17; 1800 linear feet steel piling also involved.

100 tons, shapes and bars, state bridge, Dummerston, Vt.; bids June 22, Montpelier.

Unstated, reactor testing station, steel storehouse, etc., for Atomic Energy Commission, Idaho Falls, Idaho; general contract to Arrington Construction Co., low $196,545.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1100 tons, Children's Orthopedic Hospital, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle; Howard S. Wright Co., Seattle, general contractor.

700 tons, additional building, Grinding Machine Division, Norton Co., Worcester, Mass., to United States Steel Supply Co., Boston; Gilbane Building Co., Inc., Providence, R. I., general contractor.

460 tons, Resurrection Hospital, Chicago, Bell Construction Co., Inc., that city, contractor to Joseph T. Ryerson & Son Inc., Chicago.

300 tons, addition to Rock Island powder plant, Washington state, to Judson-Pacific-Murphy, San Francisco.

280 tons, plant addition, Bell & Howell Co., Lincolnwood, Ill.; Ragnar Benson Inc., Chicago, contractor; to Joseph T. Ryerson & Son Inc., Chicago.

160 tons, office of laboratory building, Armour Research Foundation, Chicago, Bell Construction Co., Inc., that city, contractor to Joseph T. Ryerson & Son Inc., Chicago.

135 tons, Langendorf Baking Co. plant, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle; Sedille Construction Co., Seattle, general contractor.

REINFORCING BARS PENDING

2500 tons, Eklutna tunnel and power project, Palmer, Alaska; bids to Bureau of Reclamation, Palmer, June 25.

250 tons, 15.5-mile Potholes east canal, Columbia Basin project; bids to Bureau of Reclamation, Denver, June 28.

150 tons, canal and wasteway projects, Columbia Basin; bids to Bureau of Reclamation, Ephrata, Wash., July 10.

100 tons, two state highway bridges, Snohomish county, Washington; general contract to Goetz & Brennan, Seattle.

PLATES . . .

PLATES PLACED

150 tons, eight storage tanks, Union Oil Co., Seattle terminals, to Consolidated Western Steel Corp., Seattle.

PLATES PENDING

1500 tons, fuel storage tanks, Elelson air field, Alaska; bids to U. S. Engineer, Seattle, June 28; similar projects are pending at McChord and Spokane, Wash., air bases, also Missoula, Mont.; government is furnishing a portion of the steel.

250 tons, 500,000-gallon water storage tank, University of Idaho, Moscow; Pittsburgh-Des Moines Steel Co., low $129,958.

100 tons or more, three elevated steel water tanks, Marine training school camps, Quantico, Va.; Pittsburgh-Des Moines Steel Co., Pittsburgh, low, $78,840.

Unstated, ten additional storage tanks, Seattle terminals; bids to Shell Oil Co., soon.

Unstated tonnage, steel water tank and tower, veterans' hospital, North Little Rock, Ark., Chicago Bridge & Iron Co., Chicago, low $54,500.

PIPE . . .

CAST IRON PIPE PENDING

400 tons, 25,000 feet 12 to 4-inch iron pipe and fittings; bids in to Bremerton, Wash., June 13.

175 tons, 8 inch pipe and fittings, also alternatives; bids in on two schedules to McChord Air Base, Washington state, June 13 and June 15, respectively.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Rutland, six 1000-hp diesel-electric units, freight service, to American Locomotive-General Electric Companies, Schenectady, N. Y.

St. Louis-San Francisco, twenty-seven 1500-hp general purpose units and ten 1200-hp switching units, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Spokane, Portland & Seattle, 500 fifty-ton box cars to Northern Pacific shops.

Transportation Corps, Army, 100 hundred-ton and 100 eighty-ton flat cars; 650 hundred-ton and 150 eighty-ton flat cars.

Union Pacific, 50 passenger cars, including sleepers, diners, chair and baggage cars, to American Car & Foundry Co., New York.

RAILS PLACED

Lehigh Valley, 2505 tons of rails, to Bethlehem Steel Co.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

General Electric Reorganizes

Six manufacturing affiliates of General Electric Co., Schenectady, N. Y., will become departments of the parent company on June 30. The affiliates are: Carboloy Co., Inc., Detroit; General Electric X-Ray Corp., Milwaukee; Locke Inc., Baltimore; Telechron Inc., Ashland, Mass.; Monowatt Inc., Providence, R. I.; and Trumbull Electric Mfg. Co., Plainville, Conn.

Chevrolet Plans Expansion

Chevrolet Motor Division, General Motors Corp., Detroit, is considering expansion of its motor plant in Buffalo, including erection of buildings containing about 1 million square feet of floor space. Cost of the project is estimated at between $20 million and $40 million, including equipment. The plans reportedly include a manufacturing building, a magnesium foundry, a forge building and a powerhouse.

Cobalt Producer Expands

About $2 million will be spent by Deloro Smelting & Refining Co. Ltd. to enlarge its smelting and refining capacity at Deloro, Ont. The company will practically double its output of cobalt by the end of 1951. The company's output totaled 60 tons in 1950.

Stamping Firm To Expand

Brown-Lipe-Chapin Division, General Motors Corp., Syracuse, N. Y., purchased 100 acres of land in that area for plant expansion. The division conducts the largest chrome plating operation in New York state.

Magnathermic Builds Plant

Magnathermic Corp., Youngstown, is building a $150,000 plant in that city, mainly for engineering and testing laboratories. The company makes a new type of induction electric furnace, used in steel, aluminum and chemical industries. It also has orders for aircraft parts and engine equipment.

Procter & Gamble To Build

Proctor & Gamble Mfg. Co., subsidiary of Proctor & Gamble Co., Cincinnati, will build a manufacturing plant in Sacramento, Calif.

Rebuilds Reheating Furnaces

Three slab reheating furnaces are being rebuilt by Rust Furnace Co., Pittsburgh, at Republic Steel Corp.'s Corrigan-McKinney Works in Cleveland. The rebuilt furnaces will supplement a new 100-ton capacity, triple-fired, zone-controlled slab heater, designed and recently installed by Rust.

Skilsaw Buys Loud-Wendel

Skilsaw Inc., Chicago, manufacturer of portable power tools, purchased controlling interest in Loud-Wendel Inc., Middleport, N. Y. This acquisition assures Skilsaw a constant source of high-quality saw blades.

Quality Hardware Machine

Continental Copper & Steel Industries Inc., New York, sold its Quality Hardware Machine Division, Chicago, to Century American Corp. and Wilmington Industries Inc.

Steelcraft Augments Business

Steel Building Division, Stefco Steel Co., Michigan City, Ind., was purchased by Steelcraft Mfg. Co., Rossmoyne, O. Manufacture of Stefco steel buildings will be transferred to Rossmoyne.

American Can To Build Plant

American Can Co., New York, will build a metal container plant in Lemoyne borough and Lower Allen township, just across the Susquehanna river from Harrisburg, Pa. The plant will have a capacity for more than 400 million food cans a year. Start of construction will depend upon the availability of structural steel and other building supplies.

Simonds Saw Builds Addition

Simonds Saw & Steel Co., Lockport, N. Y., is erecting a plant addition which, including equipment, will cost about $500,000. Expansion is scheduled for completion by the end of 1951.

Motor Grader Output To Rise

Dump car, trail car and general car business, which had been a part of Austin-Western Co., Aurora, Ill., was transferred to and is being operated from Baldwin-Lima-Hamilton Corp., Eddystone, Pa. Assets of Austin-Western were acquired by Baldwin-Lima-Hamilton Corp. on Mar. 8, 1951. Motor grader operation at the Austin-Western plant in Aurora will be expanded. Jess Mossgrove, manager, car department at Austin-

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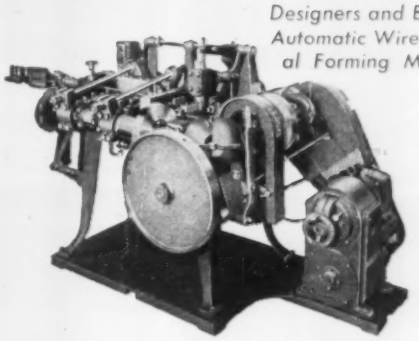

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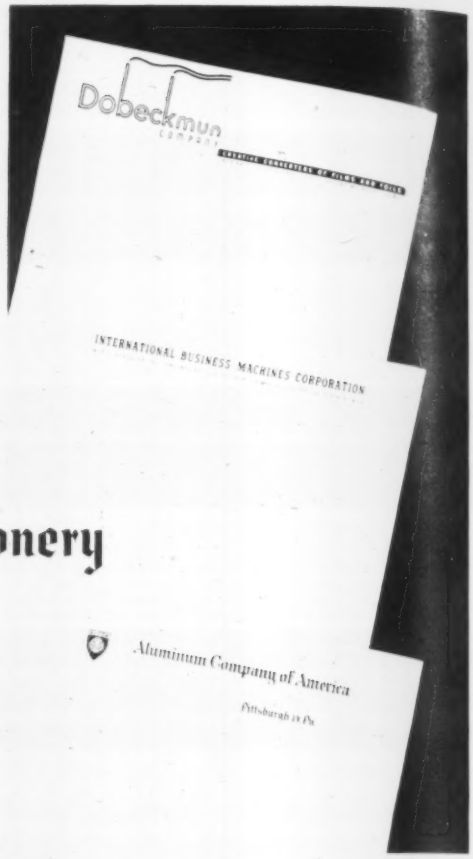

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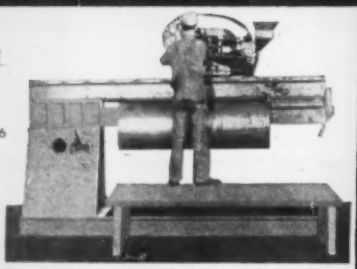

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Western, remains in charge of that department at Eddystone.

Eclipse Metal Repairs Plant

Damage estimated at $100,000 was caused by a fire at the plant of Eclipse Metal Mfg. Corp., Eden, N. Y. The company makes picnic grills and allied metal equipment. The structure is being rebuilt for resumption of production.

Cummins Expands Further

Major expansion of engine production capacity, involving new facilities to cost $6 million is planned by Cummins Engine Co. Inc., Columbus, Ind. This third expansion project within the past nine months will increase production capacity at Cummins at least 50 per cent over the 1950 record high level.

Moves New York City Offices

Spang-Chalfant Division, National Supply Co., Pittsburgh, will move its New York city offices to 600 Fifth Ave. on June 20. Also being moved to the new address are National Supply Export Corp. and export department of the Engine Division of National Supply.

Enters Steel Tubing Field

Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Boston, has expanded into the field of steel tubing. Wolverine has exclusive rights to produce tubes by the patented forming and brazing processes of Karmazin Products Corp., Wyandotte, Mich. The division is able to manufacture brazed tubes of both ferrous and nonferrous metals. Previously, the division fabricated copper, copper-base and aluminum tubing.

Chemical Plant Enlarged

Buffalo Electro-Chemical Co., Tonawanda, N. Y., is building a $1,450,000 addition to its plant for production of potassium persulphate and hydrogen peroxide.

Gray Iron Redesign Contest

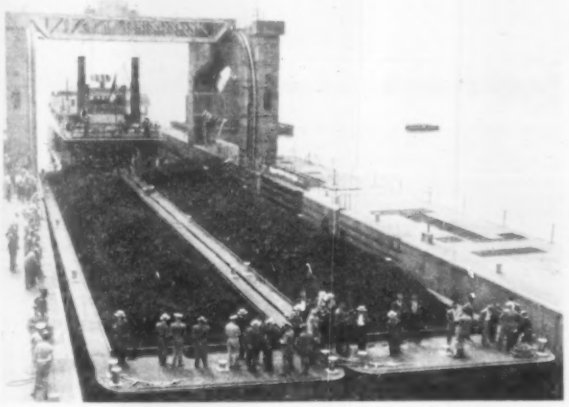
Gray Iron Founders' Society, Cleveland, opened its 1951 redesign contest. The award program gives recognition to those who submit the best examples of the redesign of a component for production in gray iron. Prizes totaling $350 will be given to the top three winners; first award is $200.

Standard To Move Plant

Railroad car-roof manufacturing facilities of Standard Railway Equipment Mfg. Co., Hammond, Ind., will be moved to that city from New Kensington, Pa. Contracts for a major part of the $3.5 million program have been executed. The company fabricates around 40,000 tons of galvanized sheets a year.

Schedules Materiel Exhibit

An exhibit of materiel will be held June 25-30 in Will Rogers Memorial Coliseum, Fort Worth, Tex., under sponsorship of the Air Force, Navy and Army. Prime contractors of the South, Southwest, Midwest and Rocky Mountains will display products they are now making for the armed services for inspection by manufacturers who are potential subcontractors for such work. Major subcontractors also will display their military products for



UNLOCKED: First vessel through the new $7 million lock in the Monongahela river at Braddock, Pa., was U. S. Steel Co.'s Homestead, pushing two barges of coke. The lock was built by Dravo Corp., Pittsburgh, and is 360 feet long and 56 feet wide

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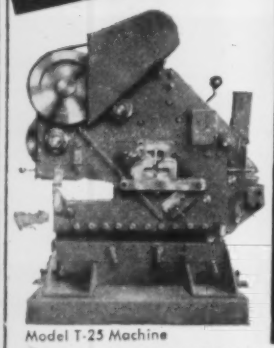

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Tees	3-1/8" x 5/16"	4" x 3/8"
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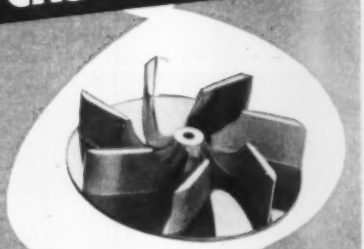

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Abco Aluminum Moves Plant

Abco Aluminum & Brass Works moved its plant and offices to larger quarters at 5235 Griggs Rd., Houston.

Delco Builds in Rochester

A building for the manufacture of defense products, particularly small motors used by the Air Force, will be built in Rochester, N. Y., by Delco Appliance Division, General Motors Corp., that city. Paul H. Rutherford is general manager of the division.

Universal Sheet & Strip

Universal Sheet & Strip Steel Co., Chicago, is constructing a $750,000 warehouse and office in the Kenwood manufacturing district, that city.

Buys Wheel Goods Firm

Northern Indiana Steel Supply Co., Michigan City, Ind., purchased La Porte Corp., La Porte, Ind. The company will be operated as a subsidiary of Northern Indiana under the name of Pal Wheel Goods Inc. and will manufacture baby walkers, bicycles and velocipedes in a plant being constructed in La Porte.

Forms Machine and Tool Firm

Masten Machine & Tool Co. Inc. was incorporated in Buffalo. Principals are Isadore Dobosen, Evelyn M. Hinsken and Joseph A. Dunn.

Fabricated Steel Organized

Fabricated Steel Inc., a newly organized company, purchased the physical assets of Fabricating Division, Southwestern Ohio Steel Inc., Hamilton, O. The new firm will carry on a structural fabricating business of the same type as was previously conducted by Southwestern. William J. Wolf is president of Fabricated Steel Inc.

Welding & Steel Fabrication

Welding & Steel Fabrication Co., Buffalo, is converting a former airplane hangar in Tonawanda, N. Y., to a plant building and will erect an addition to it.

New Westinghouse Subsidiary

A wholly owned subsidiary, Canadian Westinghouse Supply Co., was organized in Hamilton, Ont., to distribute products of Canadian Westinghouse Co. Ltd. Roy L. Brown is executive vice president and general manager of the new firm. The supply company also will sell under contract other lines, such as cable, conduit and fittings, that are not manufactured by Canadian Westinghouse.

Du-Co Ceramics Expands

Du-Co Ceramics Co., Saxonburg, Pa., is completing an expansion program which will provide a 600 per cent increase in floor space by the end of July. The company produces steatite, electrical and refractory porcelain and other ceramic compositions for special applications.

Opens Phoenix Sales Office

Ducommun Metals & Supply Co., Los Angeles, opened a sales office in Phoenix, Ariz., under the direction of B. G. Nelsen. The company carries a stock of more than 60,000 items, including steel, brass, copper, stainless steel, aluminum, tools, abrasives, tubing and industrial supplies of all types.

Plans $20 Million Plant

Certificate of necessity was granted to Crown Zellerbach Corp., San Francisco, for construction of a $19,732,769 pulp plant at Camas, Clark county, Wash.

Promat Appoints Agents

Promat Division, Poor & Co., Chicago, appointed the following distributors for its line of metal plating chemicals and processes: Haviland Products Co., Grand Rapids, Mich.; Wagner Bros. Inc., Detroit; Donald Sales & Mfg. Co., Milwaukee; Bart-Messing Corp., Belleville, N. J.; Reynolds-Robson Supply Co., Philadelphia; Ardco Inc., Chicago. Ralph R. Jenkins is sales manager of Promat division.

Brass Foundry Organized

State Foundry Inc. was organized in Albany, N. Y., to operate a brass foundry at 892 Broadway. The company has taken over the shop previously occupied by Capitol Brass Foundry. George W. Gallien, formerly a foundryman with General Electric Co., heads the new firm.

Kennametal Gets War Work

Kennametal Inc., Latrobe, Pa., received a $4,105,281 contract from the Pittsburgh Ordnance District for the production of 76-mm cemented carbide armor-piercing projectiles. Second largest manufacturer of cemented carbides in the world, Kennametal turned out substantial quantities of similar high-velocity projectiles in World War II. Subcontracts will be let for the carriers and jackets.

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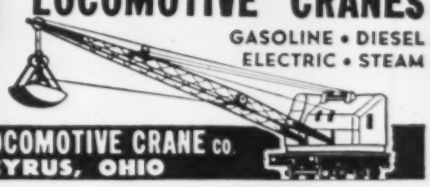

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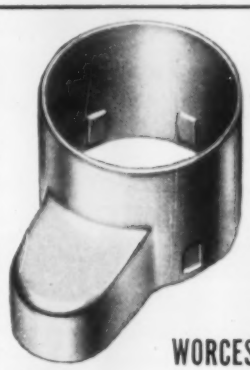

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